244

CHANGES

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
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Westinghouse	H-740T21, H-742K21, H-743K21 (Ch. V-2233-1) Tel. Rec. Prod. Chg. Bul. 99	244-1

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 9 IN SET 212

Ch. V-2233-1

In later production of Westinghouse models H-740T21, H-742K21 and H-743K21 numerous changes were made. A list of these changes is given below.

TO REDUCE EXCESSIVE POWER DISSIPATION IN V1.

A 1000Ω, 1 watt resistor was added, in series with R27, to 290 volts.

TO IMPROVE THE OPERATION OF THE TONE CONTROL

C75, in the plate circuit of V9, was changed from 470MMF to 270MMF and .001MFD capacitor was added, in parallel with C75. This change eliminates excessive high tones.

TO IMPROVE THE LIMITING ACTION OF V9

R59, V9 plate lead resistor, was changed from 220KΩ to 330KΩ.

TO ELIMINATE VERTICAL LINE

R124 was changed to 100KΩ. This line appeared on the right side of the screen under certain conditions.

TO ELIMINATE RIPPLE

C104, in the plate circuit of V16, was changed from .1MFD to .25MFD.

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3924 MEADE ST.
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TO REDUCE AMBIENT TEMPERATURE OF T2

The width coil was changed to part #V-11546-3.

TUNER REVISED

The tuner was modified to provide an adjustable coupling for the #2 UHF input. This adjustment is located adjacent to the RF Amp. (V1). To adjust, tune in a UHF channel in the normal manner and adjust the slug for best picture.

TO REDUCE THE AVERAGE CURRENT IN T2

R120, horizontal output screen bleeder resistor, was changed from 68KΩ to 39KΩ.

TO IMPROVE VIDEO RESPONSE

To improve the high frequency response of the video amplifier, the lead dress was improved by removing R44 and reconnecting it from the center arm of the picture control, R2, to ground.

TO IMPROVE FRINGE RECEPTION

To prevent picture and sound separation in fringe areas, C36, in the grid circuit of V3, was changed from .5MMF to 1MMF, and a .47MMF capacitor was added between the top of the primary and secondary windings of L22.

TO PREVENT PICTURE DISTORTION

To prevent distortion, caused by vertical pulses entering the horizontal circuits, C101 was changed from .1MFD to .25MFD.

DAMPER TUBE SUBSTITUTION

In some chassis the 6AX4GT damper tube was substituted with a 6AS4GT tube.

WESTINGHOUSE MODELS H-740T21, H-742K21, H-743K21 (Ch. V-2233-1)

PRODUCTION CHANGES
BULLETIN 99

PRODUCTION CHANGES
BULLETIN 99

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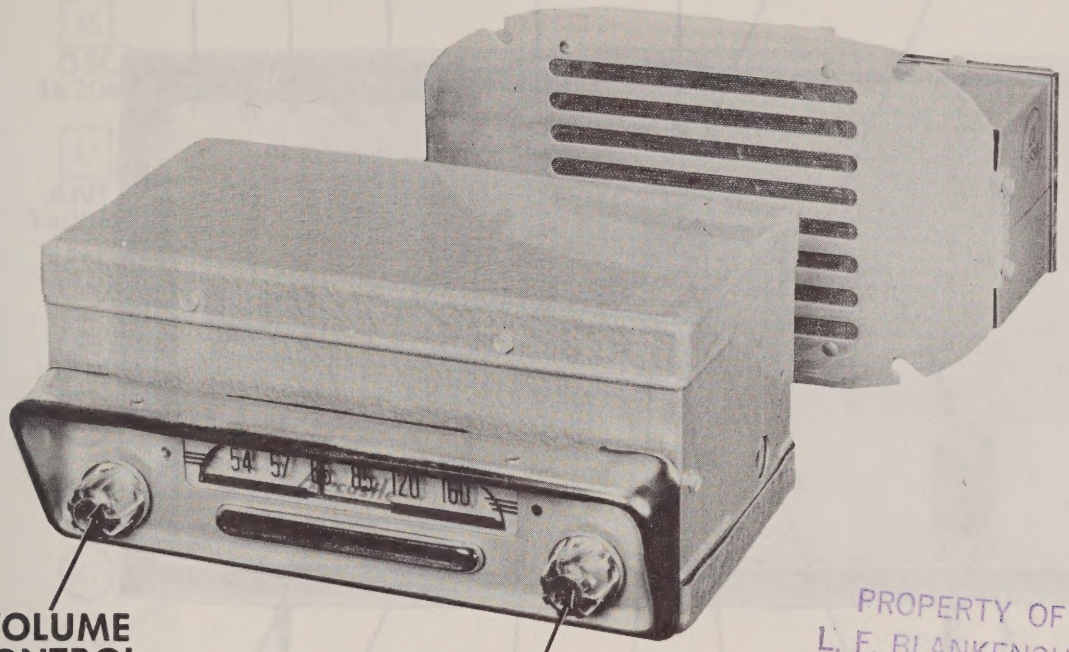
AIRCASTLE
MODEL 610.FE-153



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DENVER, COLORADO

AIRCASTLE
MODEL 610.FE-153

TRADE NAME	Aircastle Model 610.FE-153 (For 1952-1953 Ford Automobiles)
SUPPLIER	Spiegel, Inc., 1061 W. 35th. St., Chicago 9, Ill.
TYPE SET	Battery Operated Superheterodyne Custom Built Automobile Receiver
TUBES (Seven)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 (or) 6AT6 Det.-AF Amp., 6AU6 AVC Control, 6V6GT Audio Output, 6X5GT Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.4 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400%Mod)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1620KC	"	"	A5	"
3.	68MMF	High side to antenna receptacle. Low side to chassis.	1400KC	Tune to 1400KC signal	"	A6, A7	"
4.	With receiver installed in car and antenna fully extended tune to a weak station near 1400KC and adjust A7 for maximum volume.						

NOTE: In very weak signal areas the "Electro Touch" tuning motor may continue to run after the tuning bar has been released. In such cases the radio should be switched off, then back on again and then the desired station should be tuned in manually.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRCASTLE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4A	Det-AF Amp.	6AV6	6AV6	7BT	
B	Det-AF Amp.	6AT6	6AT6	7BT	
V5	AVC Control	6AU6	6AU6	7BK	
V6	Output	6V6GT	6V6GT	7S	
V7	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRCASTLE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■20	350	CE86	AFH3-107		C080		FP330	TVL-3636	
B	▲20	350								
C	20	25								
C2	.05	200	C503-2	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	100		CC101	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C4	22		CC220	SI22	D6-220	TP22	GP1K-220	UC-5322	5GA-Q22	
C5	5		CC47	SI5	D6-050	TP06	GP1K-050	NT-555	5GA-V5	
C6	20			SI20NP0	TCZ-20	TZ13	NP0K-20	ZT-542	5TCC-Q2	
C7	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C8	75			SI75	D6-750	G039	GP1K-750	UC-5475	5GA-Q75	
C9	.05	200	C503-2	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C10	200		CC201	SI200	D6-201	TP38	GP1K-201	UC-532	5GA-T2	
C11	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C12	200		CC201	SI200	D6-201	TP38	GP1K-201	UC-532	5GA-T2	
C13	.01	600	C103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C14	.05	200	C503-2	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C15	.01	600	C103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C16	.5	100	C504-1	VHC-36		MP2P5		RF480	HC-1	
C17	.005	200	C502-4	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C18	.01	600	C103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C19	.5	100	C504-1	VHC-36		MP2P5		RF480	HC-1	
C20	.008	1600	C802-16	P1688-008		CUB16D8		PT1628	MB-D8	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	750KΩ	½	RV-100	Q13-137		AB-70	U-51	Volume
B	Shaft		Not Req.	S5		AK-3	EB-214	Attach to R1A
C	Switch		Not Req.	76-1		KB-4	US-26	Attach to R1A

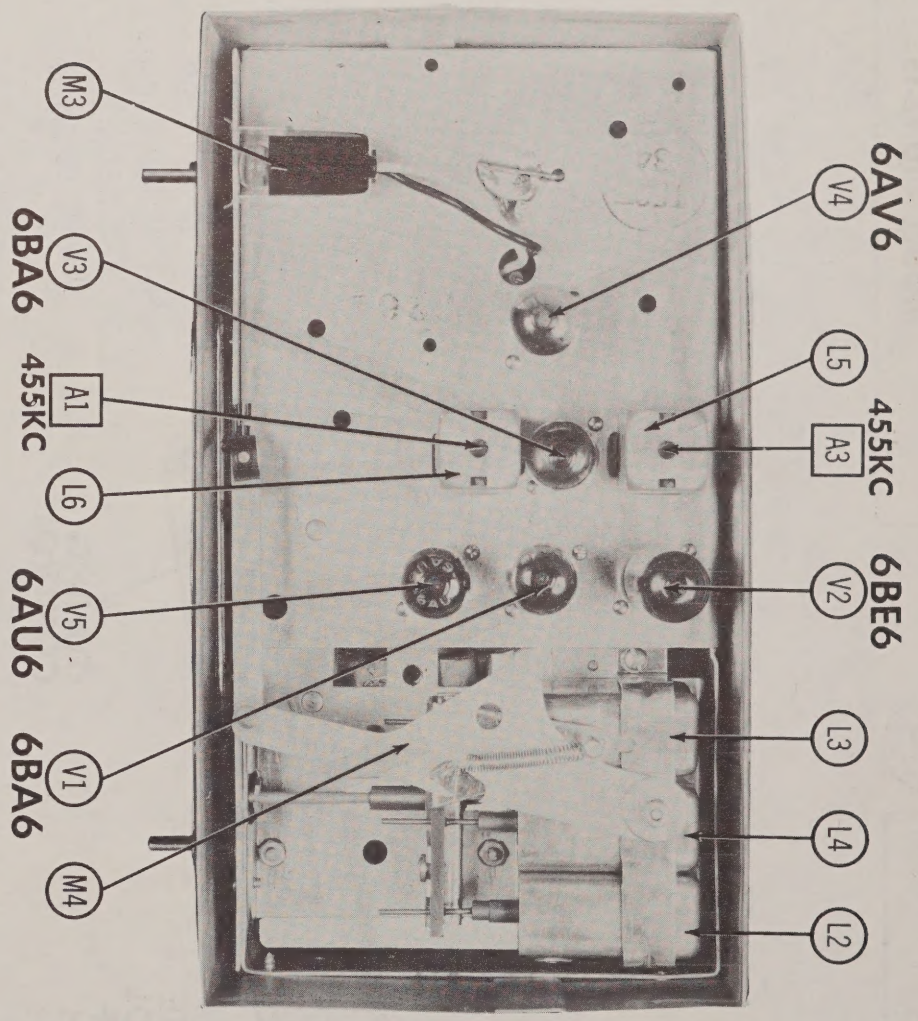
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRCASTLE PART No.	IRC PART No.	
R2	470KΩ	½	R474	BTS-470K	
R3	270Ω	½	R271	BTS-270	
R4	10KΩ	½	R103	BTS-10K	
R5	22KΩ	½		BTS-22K	Note 1
R6	1500Ω	½	R152	BTS-1500	
R7	22KΩ	2	R223-2	BTB-22K	
R8	2.2Meg	½		BTS-2.2Meg	
R9	10 Meg	½	R106	BTS-10 Meg	
R10	270KΩ	½	R271	BTS-270K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRCASTLE PART No.	IRC PART No.	
R11	470KΩ	½	R474	BTS-470K	
R12	270KΩ	½	R271	BTS-270K	Note 2
R13	82Ω	½	R820	BTS-82	
R14	8200Ω	1	R822-1	BTA-8200	
R15	470KΩ	½	R474	BTS-470K	Note 3
R16	330Ω	½	R331	BTS-330	
R17	1000Ω	1	R102-1	BTA-1000	
R18	100Ω	½	R101	BTS-100	
R19	100Ω	½	R101	BTS-100	

Note 1. Some models may use a 47KΩ resistor in this application.
Note 2. Some models may use a 250KΩ resistor in this application.
Note 3. Some models may use a 500KΩ resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRCASTLE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	6.3VCT 2.7A	430VCT .043ADC			TV-100A	P-6301			V-3801	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRCASTLE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	5KΩ	3.2Ω	Part of Speaker	A-3877	A-2930	S-3X	Z1000	TS-24S51	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3.2Ω	PM-705B PM-255-2 ①	ST-803 Mod. P525-V	52A1	① Alternate speaker

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRCASTLE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Choke	.7Ω		L352	19-1004		4610	8 Microhenries
L2	Ant. Coil	13Ω						Part of tuning unit
L3	RF Coil	12Ω						Part of tuning unit
L4	Osc. Coil	1Ω	6Ω					Part of tuning unit
L5	Input IF	18Ω	18Ω	1655-16	16-6758	BC-352	12-C1	
L6	Output IF	18Ω	18Ω	1655-16	16-6758	BC-353	12-C2	
L7	Fil. Choke	0Ω		L203		BC-537	5221	1.5 Microhenries
L8	Vibrator Hash Choke	0Ω		L202		BC-537	5221	13 Microhenries

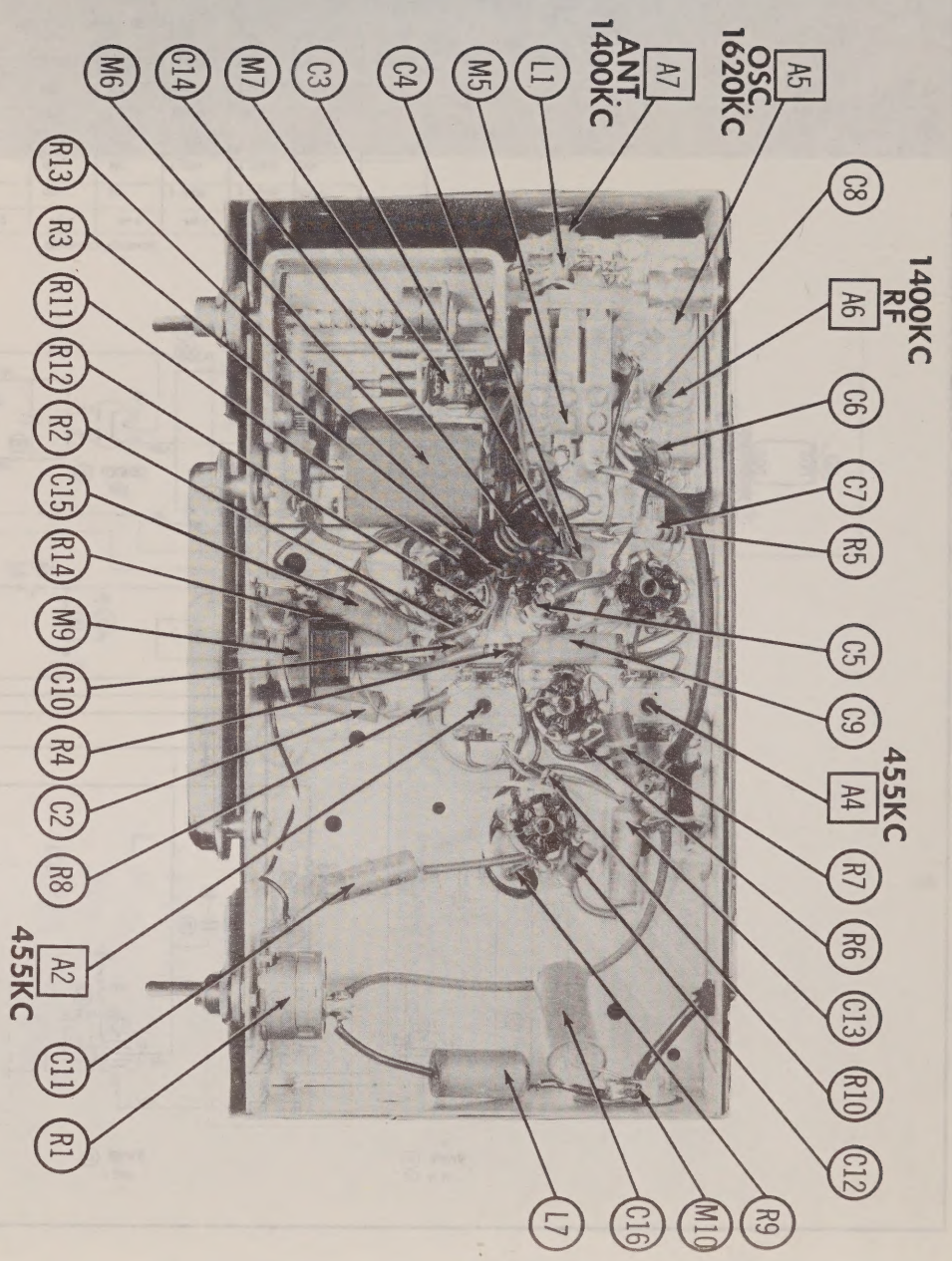
VIBRATOR

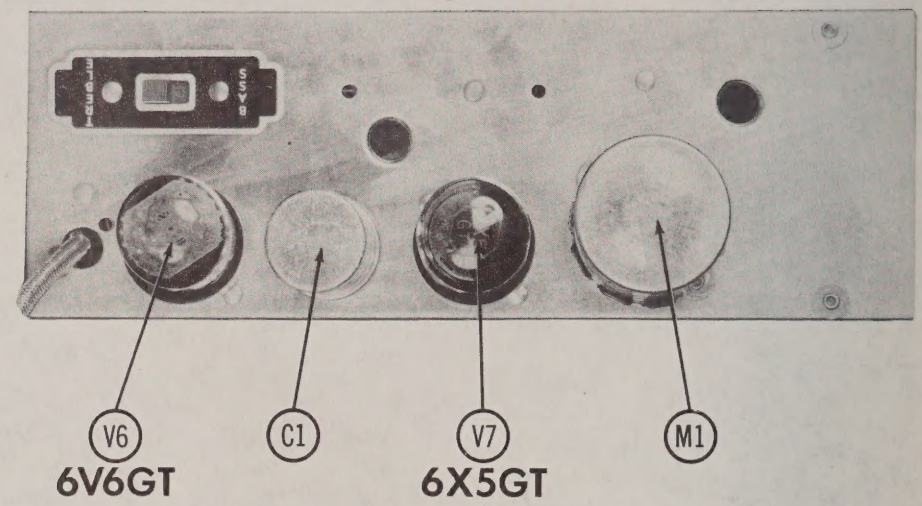
ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AIRCASTLE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115∿	V-83	5301	859	5301	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AIRCASTLE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	A201	A300	307014. (SFE-14A)	155014	SFE14	HDI

CHASSIS—BOTTOM VIEW





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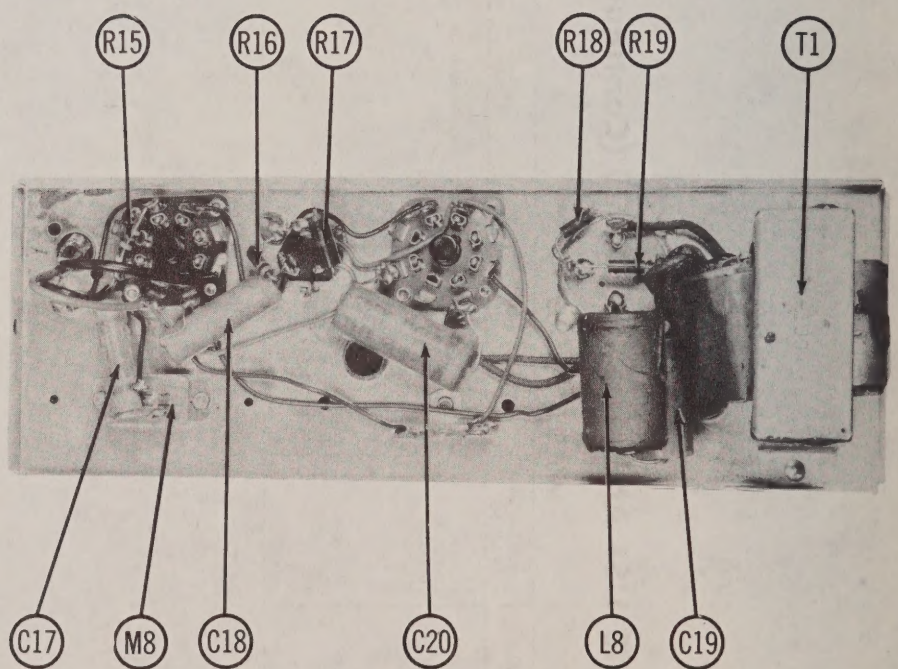

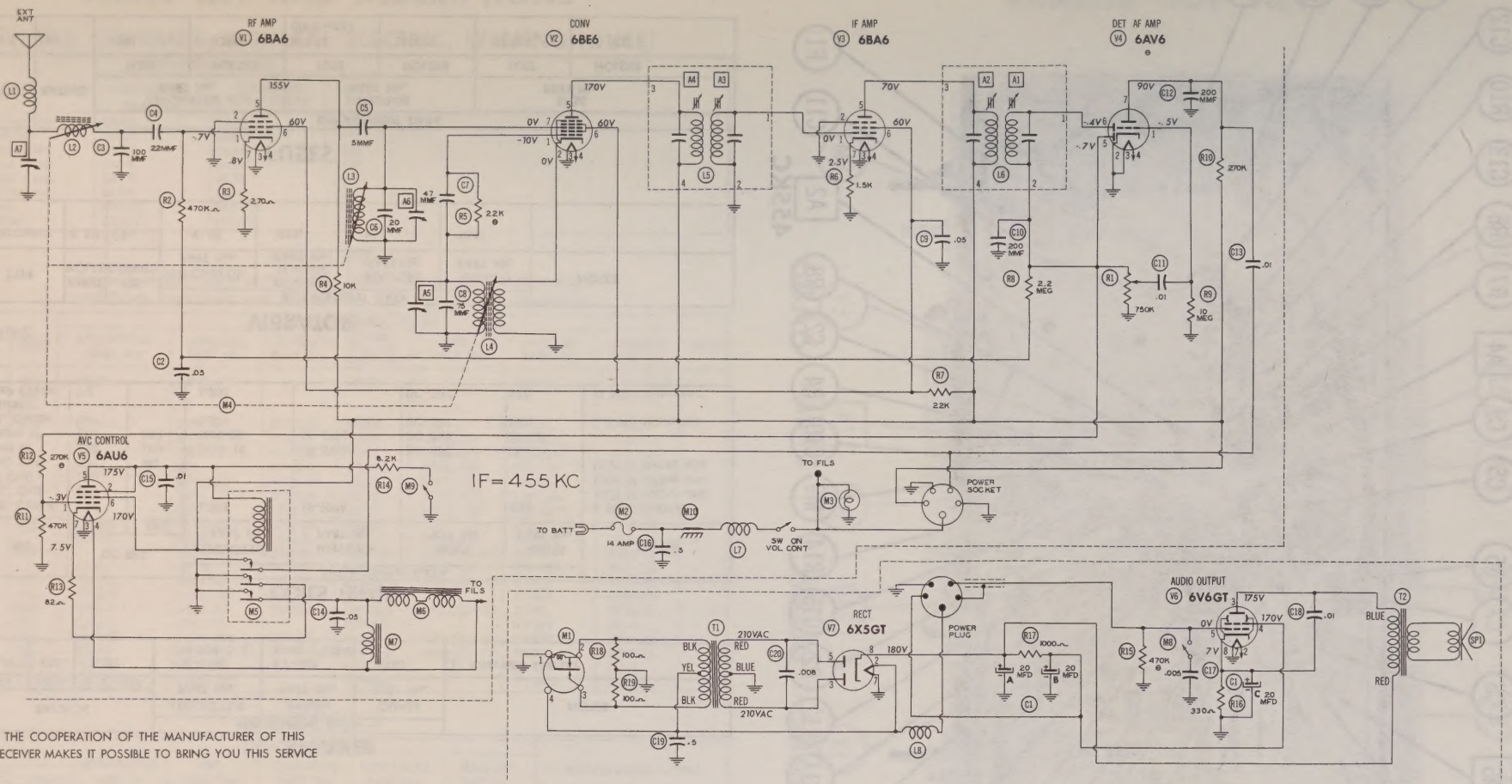

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	3.2Meg	0Ω	0Ω	.5Ω	† 11KΩ	† 23KΩ	270Ω	
V 2	6BE6	22KΩ	1Ω	0Ω	.5Ω	† 1KΩ	† 23KΩ	12Ω	
V 3	6BA6	18Ω	0Ω	0Ω	.5Ω	† 1KΩ	† 23KΩ	1.5KΩ	
V 4	6AV6	10 Meg	0Ω	0Ω	.5Ω	740KΩ	750KΩ	† 250KΩ	
V 5	6AU6	470KΩ	† 1KΩ	0Ω	.5Ω	† 1KΩ	† 1KΩ	INF	
V 6	6V6GT	INF	.5Ω	† 360Ω	† 1KΩ	470KΩ	INF	0Ω	330Ω
V 7	6X5GT	INF	.5Ω	380Ω	INF	345Ω	INF	0Ω	300KΩ

† MEASURED FROM PIN 8 OF V7.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 8.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
M3	Dial light	T51	# 51
M4	Tuner	TU-1001	Permeability, complete with motor, relay, solenoid, etc.
M5	Relay	TU-1000-4	
M6	Motor	TU-1000-2	Tuning drive
M7	Solenoid	TU-1000-3	Motor actuating
M8	Switch	SS-1	Tone control
M9	Switch	SP-1	Station selector
M10	Spark plate		
A7	Trimmer cap	TU-1000-8	Antenna (dual)
	Knob	H310E	(2 used)
	Tuning bar	H161	Assembly
	Dial scale	D153	
	Pointer drive	H357E	Mechanism

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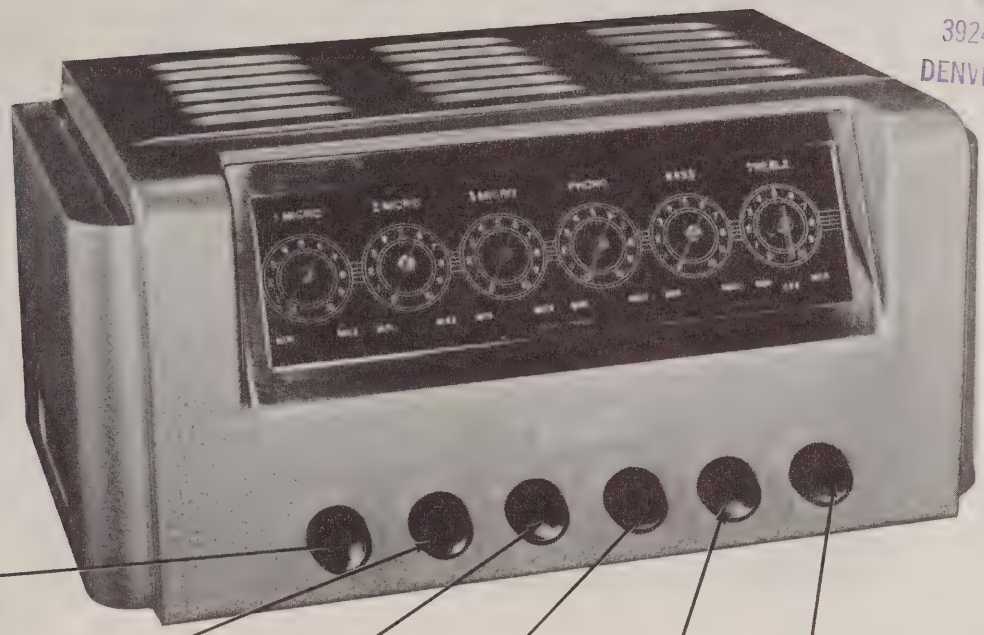
DENVER, COLORADO

BELL SOUND
MODELS PA3725-B, 3725-B



BELL SOUND
MODELS PA3725-B, 3725-B

TRADE NAME	Bell Sound Models PA3725-B, 3725-B
MANUFACTURER	Bell Sound Systems, Inc., 555 Marion Rd., Columbus, Ohio
TYPE SET	AC Operated 25 watt 4 Channel Audio Amplifier
TUBES (Eight)	Types (3) 6AU6 Mic Pre-Amp., 6SF5 AF Amp., 6N7 Phase Inv., (2) 6L6G Audio Output, 5U4G Rectifier
POWER SUPPLY	110-120 Volts AC- 50/60 Cycles RATING 1.3 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Bell Sound PART No.	STANDARD REPLACEMENT		
V1	Mic Pre Amplifier	6AU6	6AU6	7BK	
V2	Mic Pre Amplifier	6AU6	6AU6	7BK	
V3	Mic Pre Amplifier	6AU6	6AU6	7BK	
V4	AF Amplifier	6SF5	6SF5	6AB	
V5	Phase Inverter	6N7	6N7	8B	
V6	Output	6L6G	6L6G	7S	
V7	Output	6L6G	6L6G	7S	
V8	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

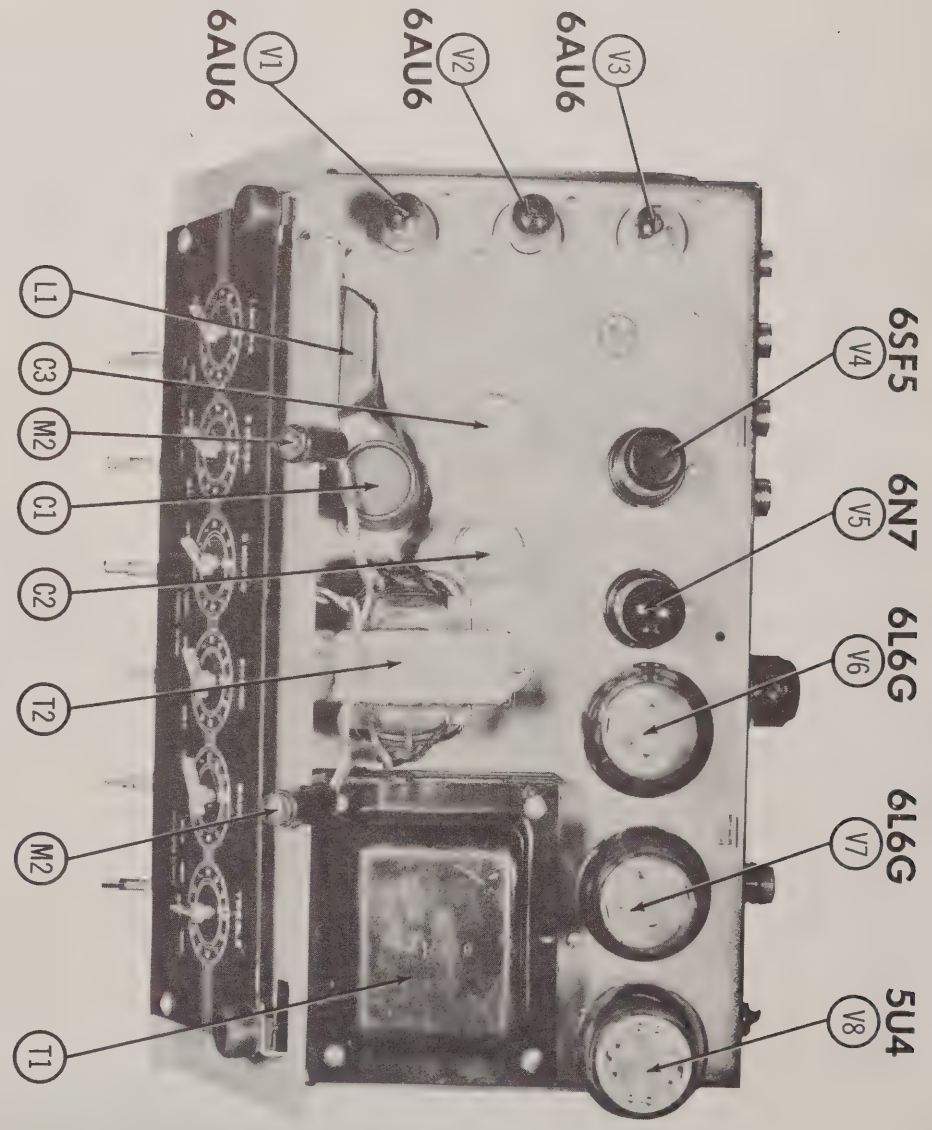
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Bell Sound PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■10	450		AFH2-47		B037		FP231	TVL-2750	
B	▲10	450								
C2A	■10	450		AFH2-47		B037		FP231	TVL-2750	Note 1
B	▲10	450								Note 1
C3A	■10	450		AFH2-47		B037		FP231	TVL-2750	Note 2
B	▲10	450								Note 1
C4	20	450		PRS450/20		BR2045		TC75	TVA-1709	
C5	20	450		PRS450/20		BR2045		TC75	TVA-1709	
C6	50	50		PRS50/50		BR505		TC39	TVA-1308	
C7	50	50		PRS50/50		BR505		TC39	TVA-1308	
C8	50	50		PRS50/50		BR505		TC39	TVA-1308	
C9	10000			BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C10	.05	600		P688-05	DF- 503	PTE6S5		PT615	6TM-S5	
C11	10000			BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C12	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C13	.005	600		P688-005	D6-502	PTE6D5	GP2-333-502	PT625	6TM-D5	
C14	10000			BPD-01	DD-103	TM5S1	811-01	DC-511	5HK-S1	
C15	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C16	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C17	.0005	600		P685-0005		PTE6T5			6TM-T5	
C18	.003	600		P688-003	D6-302	PTE6D3	GP2-333-302	PT623	6TM-D3	
C19	.1	600		P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C20	.1	600		P688-1	DF-104	PTE6P1		PT601	6TM-P1	

Note 1. Not used in all models.
Note 2. Some models may use a 20MFD @ 450 V in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Bell Sound PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1 Meg	½	B20066P-106	Q13-137	AG-63-Z	AB-70	U-53	Mike volume #1
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	1 Meg	½	B20066P-106	Q13-137	AG-63-Z	AB-70	U-53	Mike volume #2
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	1 Meg	½	B20066P-106	Q13-137	AG-63-Z	AB-70	U-53	Mike volume #3
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	½	B20066P-107	Q13-133	AG-60-Z	BSK-60	U-48	Phono volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R4A
R5A	500KΩ	½	B20066P-107	Q13-133	AG-60-Z	BSK-60	U-48	Bass
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R5A
R6A	500KΩ	½	B20066P-108	Q13-133	AG-60-Z	BSK-60-S	U-48	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R6A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R6A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Bell Sound PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R7	3. 3Meg	1/2		BTS-3. 3Meg	
R8	15KΩ	1/2		BTS-15K	
R9	100KΩ	1/2		BTS-100K	
R10	100KΩ	1/2		BTS-100K	
R11	270KΩ	1/2		BTS-270K	
R12	270KΩ	1/2		BTS-270K	
R13	3. 3Meg	1/2		BTS-3. 3Meg	
R14	15KΩ	1/2		BTS-15K	
R15	100KΩ	1/2		BTS-100K	
R16	100KΩ	1/2		BTS-100K	
R17	270KΩ	1/2		BTS-270K	
R18	3. 3Meg	1/2		BTS-3. 3Meg	
R19	15KΩ	1/2		BTS-15K	
R20	100KΩ	1/2		BTS-100K	
R21	100KΩ	1/2		BTS-100K	
R22	270KΩ	1/2		BTS-270K	
R23	4700Ω	1/2		BTS-4700	
R24	270KΩ	1/2		BTS-270K	
R25	47KΩ	1/2		BTS-47K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA Bell Sound PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R26	270KΩ	1/2		BTS-270K	
R27	1000Ω	1/2		BTS-1000	
R28	100KΩ	1/2		BTS-100K	
R29	100KΩ	1/2		BTS-100K	
R30	27KΩ	1/2		BTS-27K	
R31	43KΩ	1/2		BTS-43K	
R32	200Ω	10		1 3/4A-200	
R33	330KΩ	1/2		BTS-330K	
R34	47Ω	1			
R35	47KΩ	1/2		BTS-47K	
R36	330KΩ	1/2		BTS-330K	
R37	47Ω	1			
R38	27KΩ	1		BTA-27K	Note
R39	470Ω	1		BTA-470	
R40	6000Ω	10		1 3/4A-6000	
R41	25KΩ	10		1 3/4A-25K	
R42	100KΩ	1		BTA-100K	
R43	100KΩ	1		BTA-100K	

Note Some models may use a 47KΩ 1 watt resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ⓐ 1. 3A	780VCT .150ADC	5VAC ⓐ 3A	6. 3VCT ⓐ 4. 4A	B-20158		P-2955			

① Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	3.7KΩ CT	500Ω tap ⓐ 330Ω, 250Ω, 200Ω, 15Ω, 8Ω, 4Ω, 2Ω	B-20056-7 ①						① Drill one new mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L1	.150	90Ω	4. 8HY	B-20055	C-1710		C-15X		20C49 ①

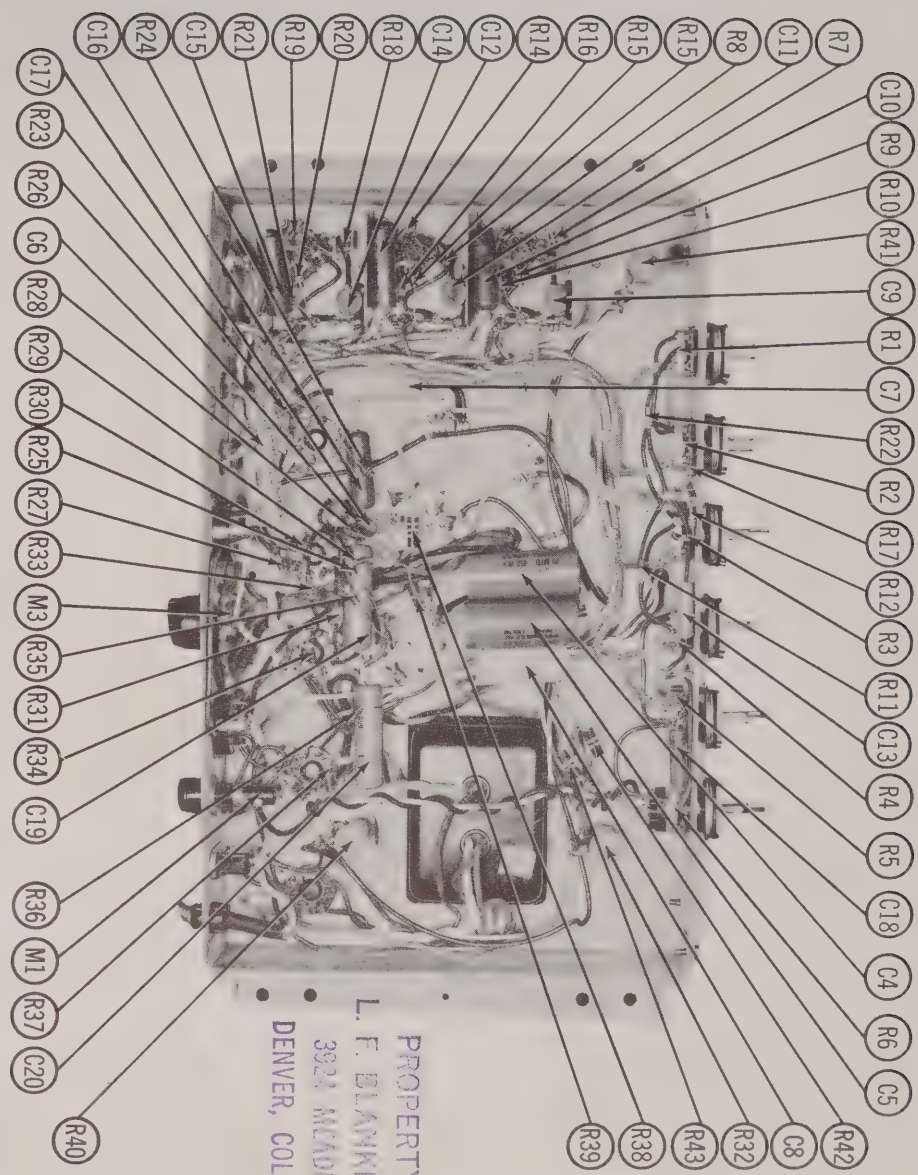
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA Bell Sound PART No. FUSE	Bell Sound PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3A			312003 (3AG-3A)	155020	AGC3	HDJ

MISCELLANEOUS

ITEM No.	PART NAME	Bell Sound PART No.	NOTES
M2	Dial Light		#51 Bayonet (2) used
M3	Switch		Impedance matching

CHASSIS—BOTTOM VIEW



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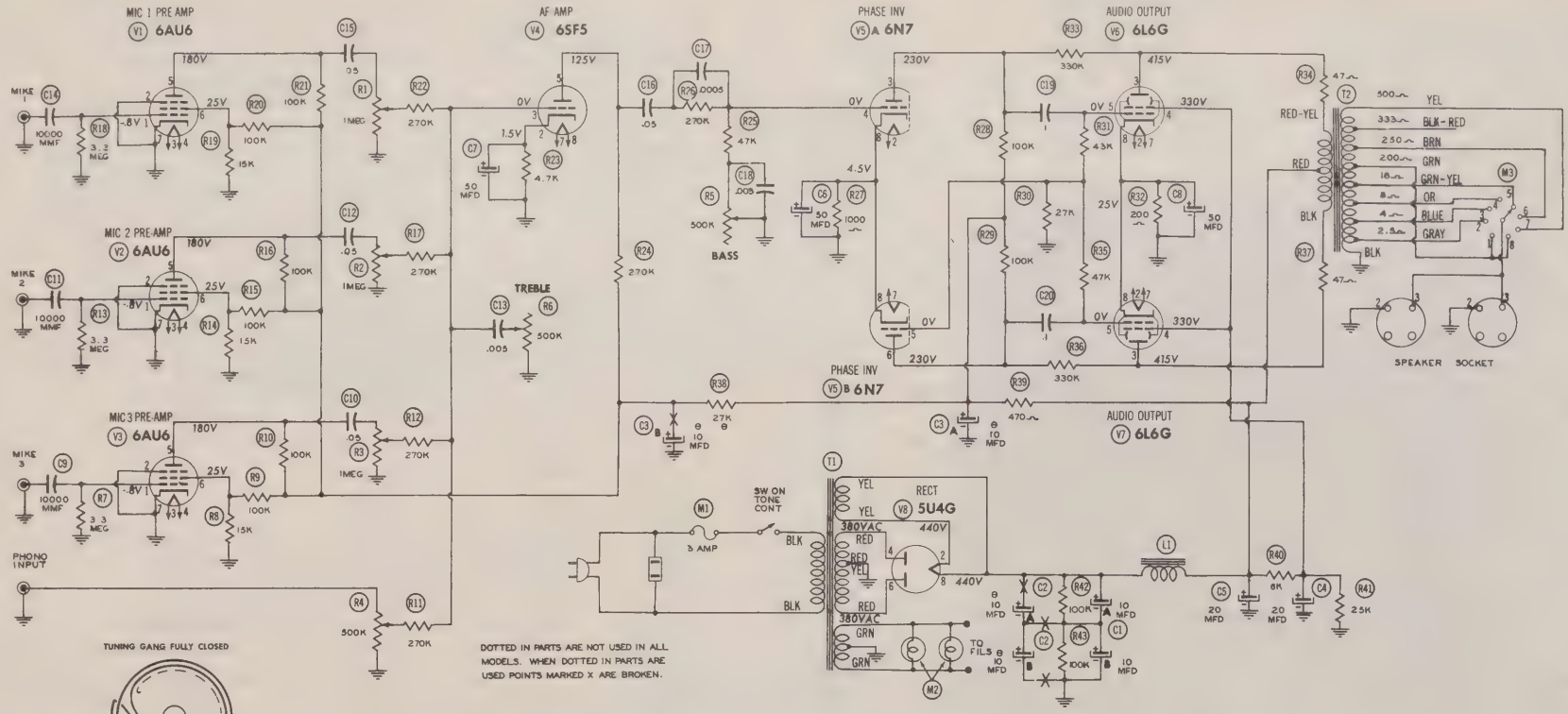
BELL SOUND
MODEL PA3725-B



DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6AU6	3.3Meg	0Ω	.1Ω	.1Ω	†100KΩ	†100KΩ	0Ω	
V 2	6AU6	3.3Meg	0Ω	.1Ω	.1Ω	†100KΩ	†100KΩ	0Ω	
V 3	6AU6	3.3Meg	0Ω	.1Ω	.1Ω	†100KΩ	†100KΩ	0Ω	
V 4	6SF5	0Ω	4.7KΩ	1.2Meg	INF	†125KΩ	INF	.1Ω	.1Ω
V 5	6N7	0Ω	.1Ω	†85KΩ	47KΩ	27KΩ	†85KΩ	.1Ω	1KΩ
V 6	6L6G	0Ω	.1Ω	†2KΩ	†8KΩ	70KΩ	†2KΩ	.1Ω	200Ω
V 7	6L6G	0Ω	.1Ω	†2KΩ	†8KΩ	74KΩ	†2KΩ	.1Ω	200Ω
V 8	5U4G	0Ω	65KΩ	INF	48Ω	INF	45Ω	INF	65KΩ

† MEASURED FROM PIN 2 OF V8

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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RETMA MEMBER

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MODELS U1700CD, U1770CD

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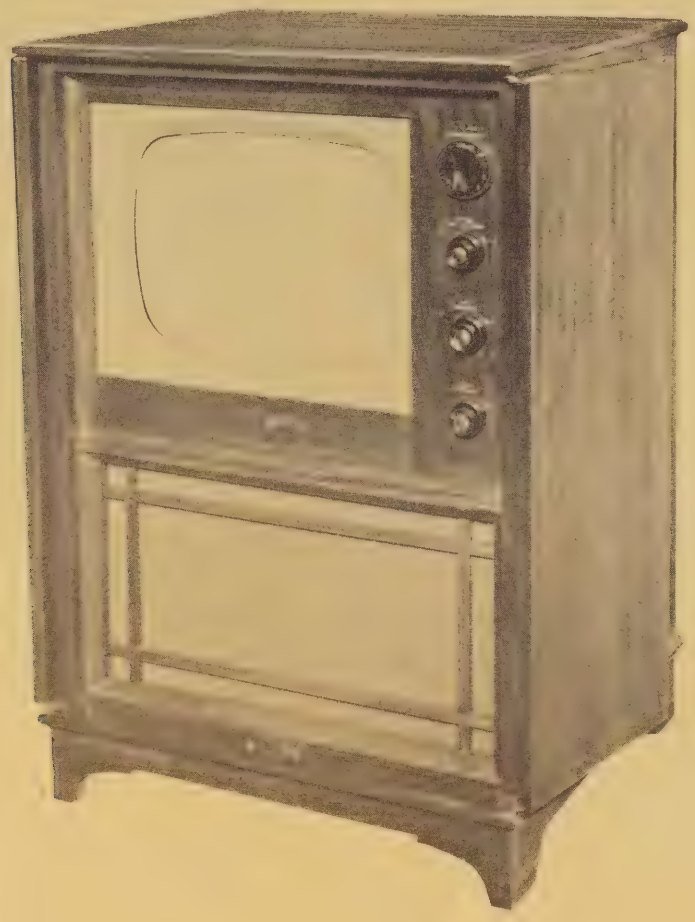

MODEL U1700CD

FADA
MODELS U1700CD, U1770CD

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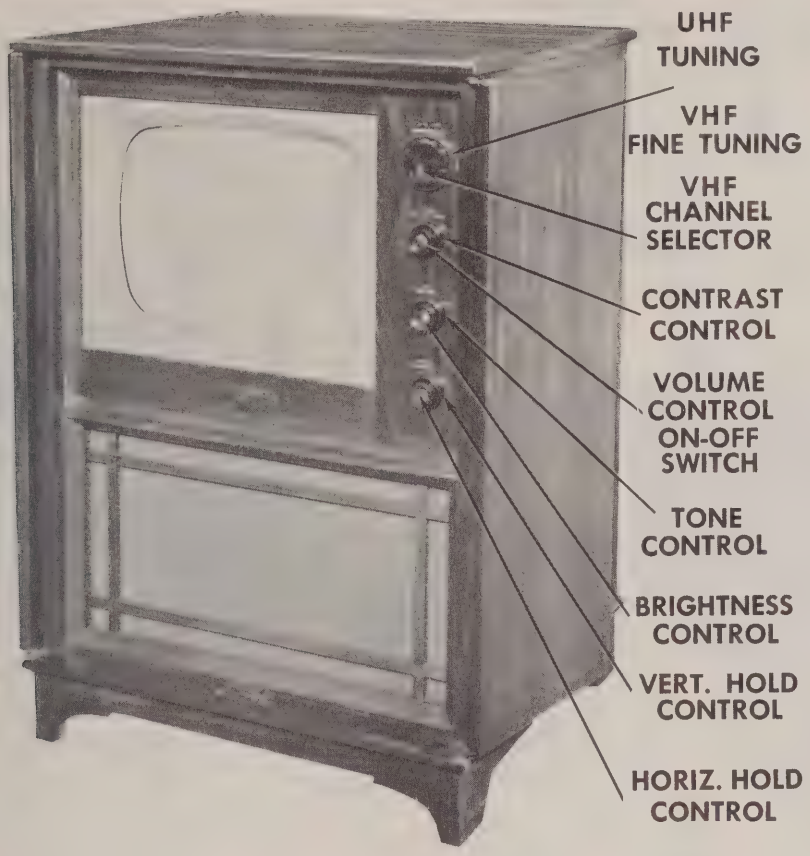
DATE 7-54 SET 244 FOLDER 4



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FADA
MODELS U1700CD, U1770CD

FADA MODEL U1700CD

TRADE NAME	Fada Models U1700CD, U1700CD
MANUFACTURER	Fada Radio & Electric Co., Inc., 525 Main St., Belleville, N.J.
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.82 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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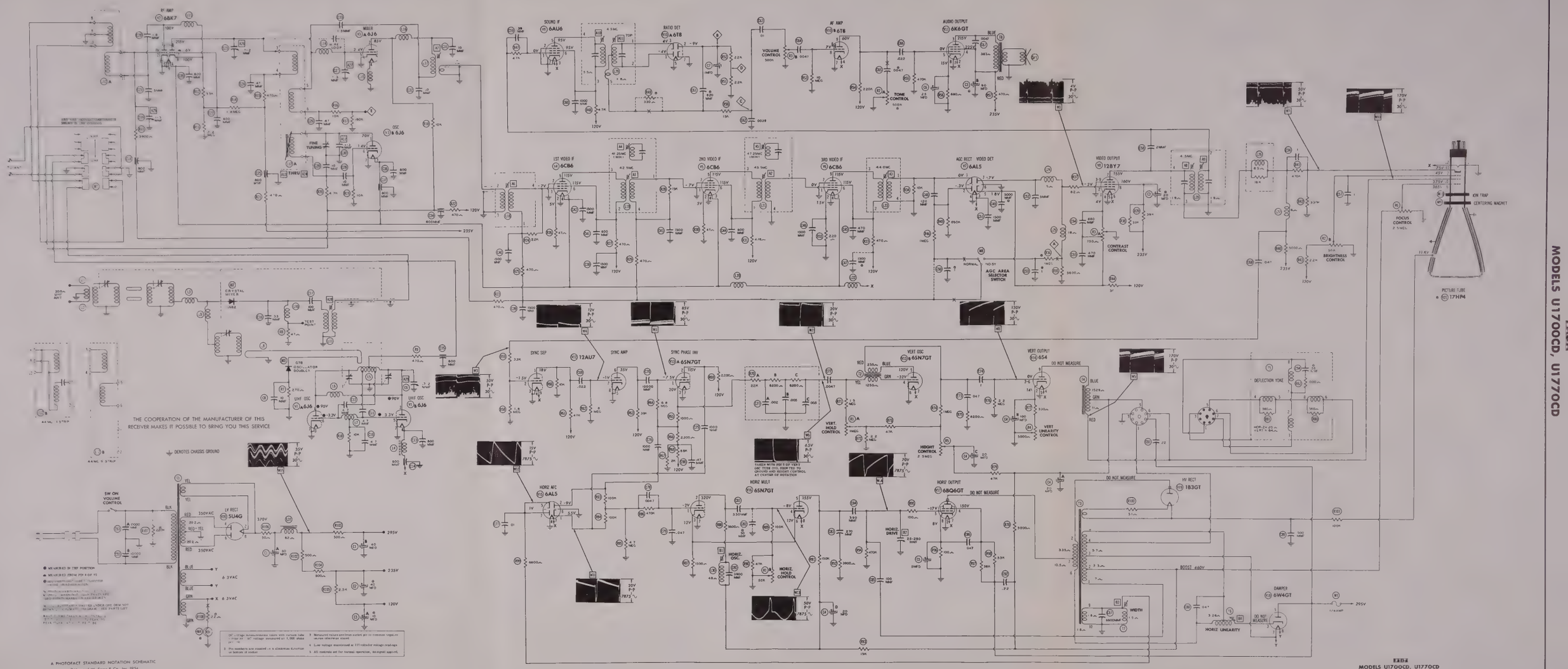

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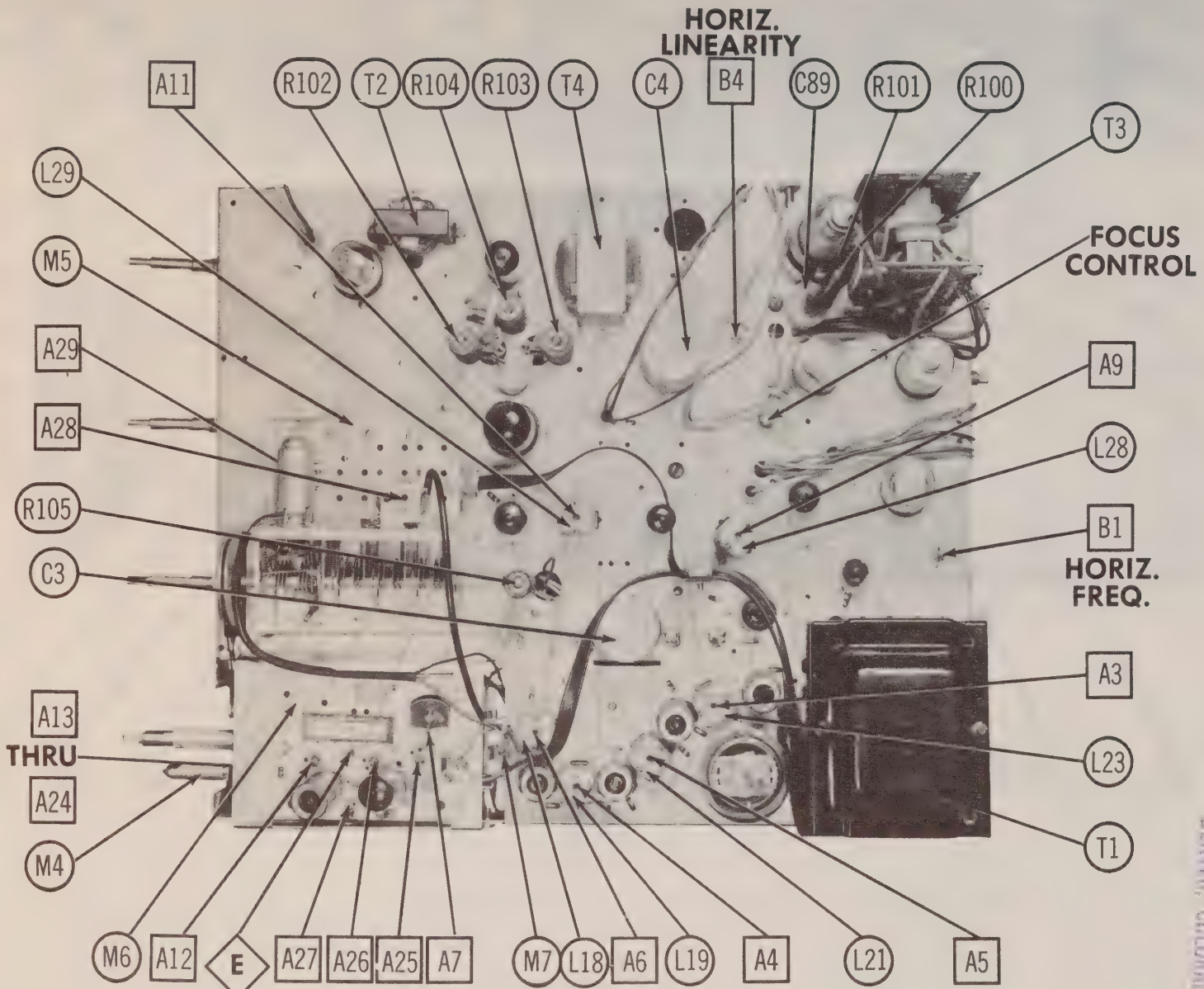
MODELS U1700CD, U1770CD



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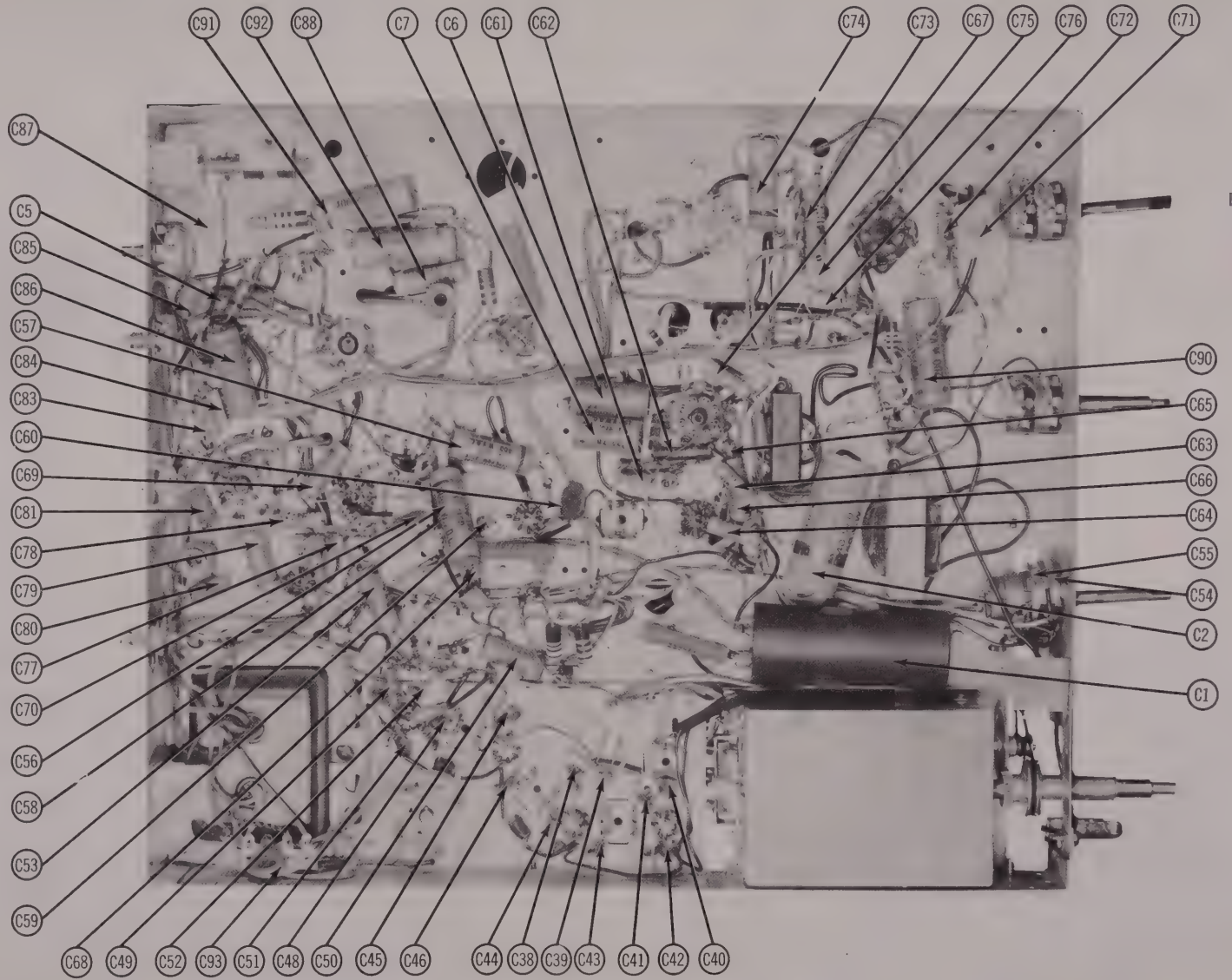

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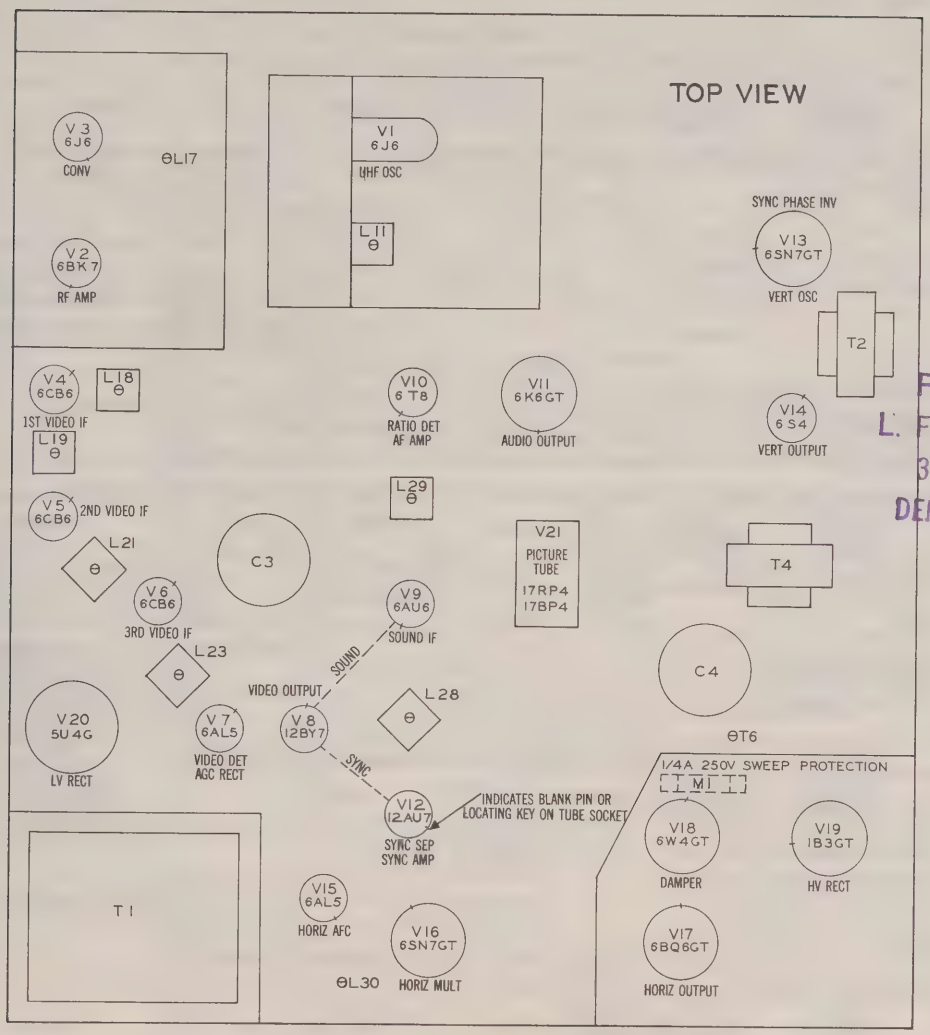
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V20**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7, V8 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V8, V21**
Has pic, no sound - **V9, V10, V11**
Overloaded picture - **V7**

SYNC FAILURE
No vert. sync - **V13**
No horiz. sync - **V13, V15, V16**
No vert. or horiz. sync - **V12, V13**

SWEEP FAILURE
No raster, has sound - **V16, V17, V18, V19, V21, Fuse (M1)**
No vertical deflection - **V13, V14**
Poor vert. linearity or foldover - **V13, V14**
Poor horiz. linearity or foldover - **V16, V17, V18**
Narrow picture - **V16, V17, V18, V19, V20**
Vert. off freq. - **V13**
Horiz. off freq. - **V13, V15, V16**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V16) to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C39. Connect the positive lead to chassis.
Set contrast control to its midrange position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD Ceramic Capacitor	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis. Use short leads.	42.5MC (Unmod)	Any non-interfering channel	DC probe thru 47KΩ to point (A). Common to chassis.	A1	Attenuate generator output to maintain not more than 2 volts at VTVM. Adjust for maximum deflection.
2.	"	"	45.5MC	"	"	A2	"
3.	"	"	44.0MC	"	"	A3	"
4.	"	"	41.25MC	"	"	A4	Adjust for MINIMUM deflection.
5.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection. Repeat steps 1 thru 5.

OVERALL VIDEO IF RESPONSE CHECK

Remove the converter tube (V3) from its socket and replace with a 6J6 which has Pin 1 removed.
This will disable the local oscillator and reduce the possibility of erroneous indications. The local oscillator may also be disabled by removing the channel 13 oscillator strip and then perform the alignment with the tuner set to channel 13.
The strip should be replaced when the overall video IF response check is completed.
If the sweep generator output is too low to give a useable indication on the scope reduce the bias (connect as under "video IF alignment") to 3 volts.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.001MFD Ceramic Capacitor	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis. Use short leads.	44MC (10MC Swp)	41.25MC 42.25MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 15KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, retouch A1, A2 and A3 to obtain desired response. Attenuate generator output for 1 volt peak to peak on scope.
7.	Direct	High side to ungrounded tube shield floating over dummy converter tube. Low side to chassis.	"	"	Any	"	A6, A7	Adjust A6 and A7 for maximum response at center of pass band (44MC) and to position the 42.25MC and 45.75MC markers as in Fig. 2. If necessary, SLIGHTLY retouch A1, A2 and A3 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 47KΩ to point (B). Common to chassis.	A8, A9, A10	Adjust for maximum deflection.
9.	"	"	"	"	DC probe thru 47KΩ to point (C). Common to point (D).	All	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 47KΩ to point (B). Low side to chassis.	A8, A9, A10	Disconnect stabilizing capacitor C7. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
9.	"	"	"	"	"	Vert. Amp. thru 47KΩ to point (C). Low side to chassis.	All	Reconnect stabilizing capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

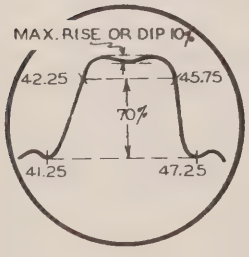

FIG. 1

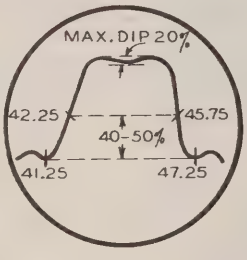

FIG. 2

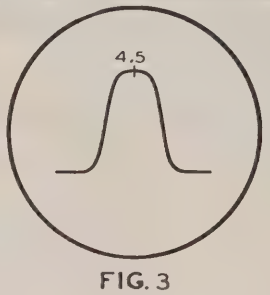

FIG. 3

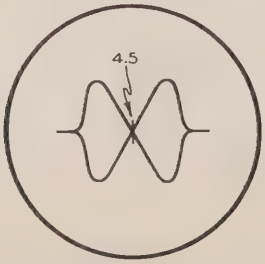

FIG. 4

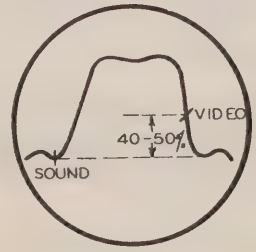

FIG. 5

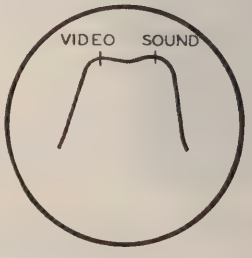

FIG. 6

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Leave the bias supply connected as under " Video IF alignment".
Remove the dummy converter tube and replace the original 6J6 in its socket.
Complete oscillator alignment may not be necessary.
If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A12.
It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If a djustment of A12 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency. The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 15KΩ to point (A). Low side to chassis.	A13	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

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DENVER, COLORADO

RF AND MIXER ALIGNMENT

Leave bias supply connected as under "Video IF alignment" except use a 3 volt instead of a 4.5 volt battery.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A25, A26 A27	Adjust for response curve similar to Fig. 6.
12.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 6. If markers fall below 70% on any channel make compromise adjustments of A25, A26 and A27 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER 44MC IF COIL ALIGNMENT

Turn the channel selector knob to "UHF" position.
Leave bias battery connected as under "Video IF alignment".
Connect the synchrnoized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	677MC (10MC Swp)	675.25MC 679.75MC	48	Vert. Amp. thru 15KΩ to point (A). Low side to chassis.	A28	Adjust for response curve similar to Fig. 5.
14.	"	"	473MC (10MC Swp)	471.25MC 475.75MC	14	"		Check for response curve similar to Fig. 5. If necessary, SLIGHTLY retouch A28 to obtain acceptable response.
15.	"	"	833MC (10MC Swp)	831.25MC 835.75MC	74	"		"

UHF OSCILLATOR ALIGNMENT

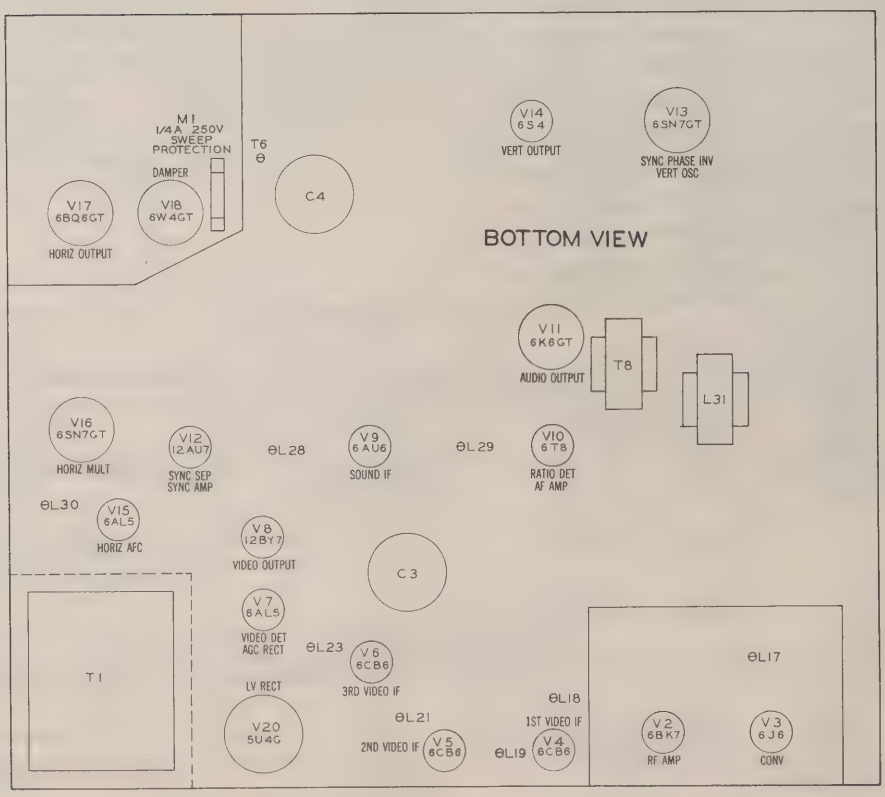
If one accurately calibrated UHF signal generator is not available the UHF oscillator may be aligned when a local UHF station is on the air. Tune to the known operating channel and adjust A29 for clearest picture and best sound. If satisfactory equipment is available proceed as shown in step 16.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	Not used	870MC	80	Use VTVM. DC probe thru 47KΩ to point (A). Common to chassis.	A29	Adjust for maximum deflection.

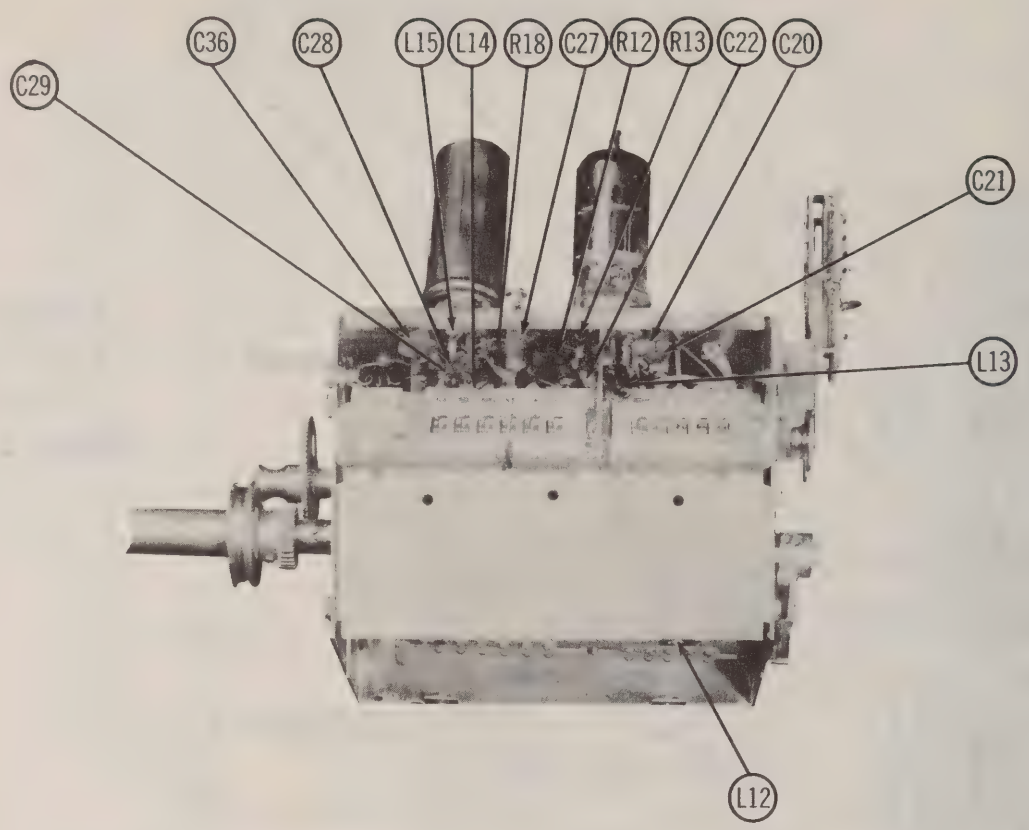
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J6	†■4.5KΩ	†■4.5KΩ	0Ω	.1Ω	10KΩ	10KΩ	0Ω		
V 2	6 BK7	†1Meg	1.7Meg	0Ω	.1Ω	0Ω	†2KΩ	1Meg	†1Meg	0Ω
V 3	6J6	†8.8KΩ	†14KΩ	.1Ω	0Ω	190KΩ	10KΩ	0Ω		
V 4	6CB6	1.7Meg	47Ω	.1Ω	0Ω	†4.1KΩ	†4.1KΩ	0Ω		
V 5	6CB6	1.7Meg	47Ω	.1Ω	0Ω	†4.1KΩ	†4.1KΩ	0Ω		
V 6	6CB6	.2Ω	220Ω	.1Ω	0Ω	†4.1KΩ	†4.1KΩ	0Ω		
V 7	6AL5	.2Ω	680KΩ	.1Ω	0Ω	600Ω	0Ω	5.6KΩ		
V 8	12BY7	230Ω	5.7KΩ	0Ω	0Ω	0Ω	.1Ω	†5.2KΩ	†20KΩ	0Ω
V 9	6AU6	47KΩ	0Ω	.1Ω	0Ω	†8.3KΩ	†8.3KΩ	0Ω		
V 10	6T8	INF	44KΩ	INF	.1Ω	0Ω	INF	0Ω	10Meg	†225KΩ
V 11	6K6GT	INF	.1Ω	†2KΩ	†1.6KΩ	470KΩ	500KΩ	0Ω	680Ω	
V 12	12AU7	10KΩ	1.8Meg	0Ω	0Ω	0Ω	†43KΩ	1.8Meg	0Ω	.1Ω
V 13	6SN7GT	6.8Meg	†5.8KΩ	15KΩ	2Meg	▲1.7Meg	0Ω	0Ω	.1Ω	
V 14	6S4	INF	3KΩ	2.2Meg	.1Ω	0Ω	2.2Meg	INF	INF	▲6.5KΩ
V 15	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	6.8KΩ	0Ω	6.8KΩ		
V 16	6SN7GT	5.2Meg	▲20.6KΩ	1.5KΩ	140KΩ	▲165KΩ	1.5KΩ	0Ω	.1Ω	
V 17	6BQ6GT	INF	.1Ω	INF	†20KΩ	470KΩ	470KΩ	0Ω	100Ω	TOP CAP ▲15Ω
V 18	6W4GT	INF	INF	300KΩ	INF	†600Ω	†600Ω	▲7.5Ω	▲7.5Ω	
V 19	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲350Ω
V 20	5U4G	INF	20KΩ	INF	19Ω	INF	20Ω	INF	20KΩ	
V 21	17BP4	0Ω	†20KΩ	PIN 6 240KΩ	PIN 10 ▲5KΩ	PIN 11 250KΩ	PIN 12 .1Ω			

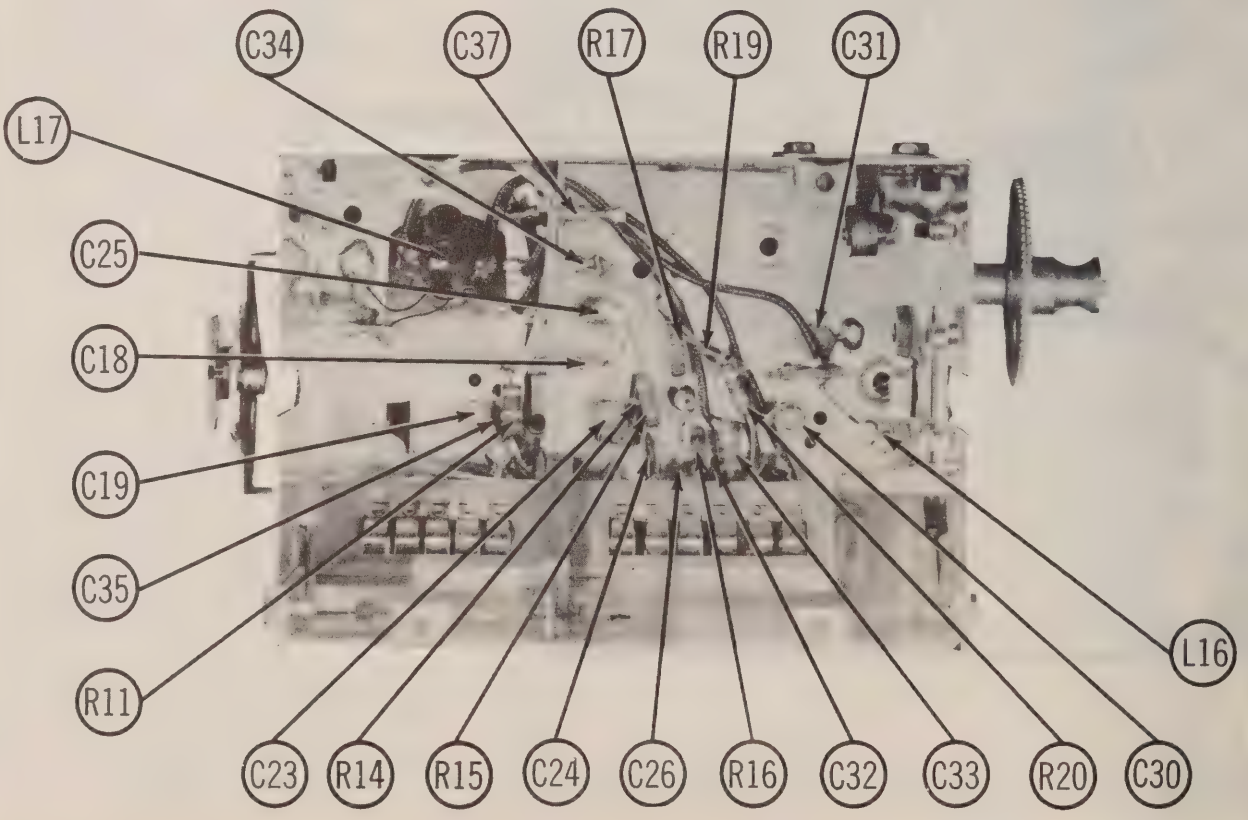
† MEASURED FROM PIN 2 OF V20
■ MEASURED IN UHF POSITION
▲ MEASURED FROM PIN 3 OF V18



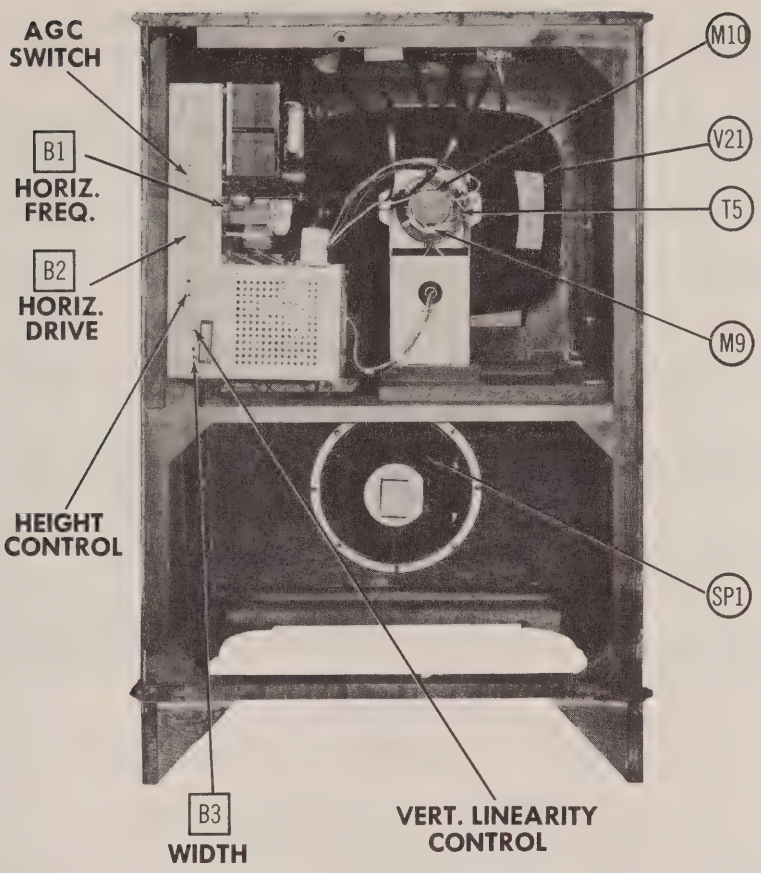
TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW



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CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

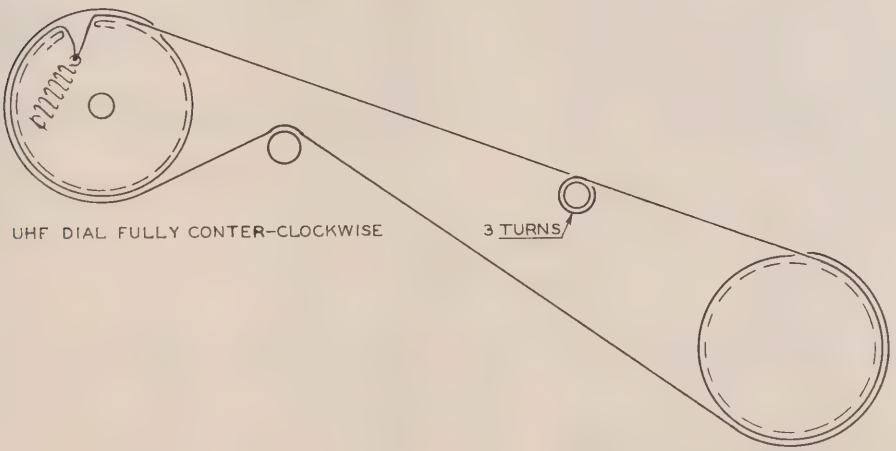
Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to its mid-range position and adjust the horizontal oscillator slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

Adjust the width slug (B3) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.



UHF DRIVE CORD STRINGING

SET 244 FOLDER 4

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17, V18 and V20. Check adjustments B2, B3, and B4. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check C86, C91, C87, C88, C92, R97, R98, T3, T5A and other associated components.	Check R91, R93, R94, C83, C84, C85 and other associated components.

DRIVE LINES

Check adjustment B2. Check by substitution V16, V17 and V18. Check T3, T5A, C94, C92, C88, C83, C84, C85, R82, R92, R93 and other associated components.

COMPRESSED LEFT SIDE

Check adjustment B2, B3 and B4. Check by substitution V17 and V18. Check components associated with the horizontal output and damper stages, especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check C79 for open. Check by substitution V17 and V18. Check T3 and T5A for internal arcing.

XMAS TREE EFFECT

Substitute V16. Check L30, C80, C81, C82 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R77, vertical linearity control and other associated components.	Check T2, C74, R76, height control and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check T4, T5B, C4A, C4B and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check T2, C73, C74, R75, R76 and other associated circuit components.

FOLDS

Check by substitution V13 and V14. Check components associated with V13B and V14 for failure or change of value.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Check by substitution V12 and V13. Check R58, R59, R60, R61, R62, R63, R64, C68, C69, C70 and other associated circuit components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check T2, C72 and other associated components.	Check vertical integrator and other associated components. Check video amplifier and IF stages for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check waveform W11.

If Satisfactoryq	If Unsatisfactory
Check C77, C80, C81, C82, R99, R88, R91, L30 and other associated components.	Check C75, C76, R83 and R84.

HORIZONTAL BENDING

Check by substitution V15, V16 and V17. Check the horizontal AFC filter network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check picture tube and other associated circuit components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check adjustments A8, A9 and video IF alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check contrast control, picture tube and other associated components.

NEGATIVE PICTURE

Check by substitution V7, V8, V2, V4 and V5. Check AGC network for component failure. Check picture tube and other associated components.

SMEAR

Substitute V7 and V8. Check peaking coils, plate load resistors, grid load resistors, coupling capacitors, contrast control, picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PICTURE

Check V2, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10 and V11. Check stages V10B and V11 using audio signal generator. Apply audio signal across R53.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V10B and V11 especially plate load of V10B, grid load of V11 and audio output transformer and speaker.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A11 for minimum buzz. If still unsatisfactory substitute V10 and realign ratio detector and audio IF stages. Check C3B, C7 and C6 for leakage.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

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DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FADA PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6J6	6J6	7BF	
V2	RF Amplifier	6BK7	6BK7	9AJ	
V3	Converter	6J6	6J6	7BF	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Detector - AGC Rectifier	6AL5	6AL5	6BT	
V8	Video Output	12BY7	12BY7	9BF	
V9	Sound IF Amplifier	6AU6	6AU6	7BK	
V10	Ratio Detector-AF Amplifier	6T8	6T8	9E	
V11	Audio Output	6K6GT	6K6GT	7S	
V12	Sync Separator-Sync Amplifier	12AU7	12AU7	9A	
V13	Sync Phase Inv. - Vert. Oscillator	6SN7GT	6SN7GT	8BD	
V14	Vert. Output	6S4	6S4	9AC	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult	6SN7GT	6SN7GT	8BD	
V17	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	3C	
V20	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	FADA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V21A	17HP4 or 17RP4	17HP4	17HP4 17RP4	17HP4 17RP4	17HP4	12L 12L	① Circuit changes necessary
B	17BP4	17BP4A ①	17BP4	17BP4 17BP4A ① 17BP4B ①	17BP4	12D 12N 12N	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	FADA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲50	475	22.79	AFH3-54		C041		FP397	TVL-3843	
B	▲40	475								
C2	40	450		PRS450/40		BR4045		TC78	TVA-1712	Note 1
C3A	▲10	350	22-80	AFH2-45		B035		FP235	TVL-3727	Note 2
B	■80	350		PRS450/20		BR2045		TC62		Note 2
C	▲20	450								Note 2
C4A	▲20	450	22.81	AFH4-80		D053		FP437	TVL-4740	
B	100	50								
C	▲20	450								
D	■20	450								
C5	5	50	22.56	PRS150/4		BR550		TC30	TVA-1303	
C6	25	50	22.66	PRS50/25		BR255		TC36	TVA-1306	
C7	1	150	22.70	PRS150/4		BR145		TC40	TVA-1402	
C8	10			SI10	D6-100	G018	GP1K-100	UC-541	5GA-Q1	
C9	.7-2				829-3		3115-01-0R5	CT565A		
C10	4.7									
C11	4.7									
C12	4.7									
C13	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C14	800			EF-001	MFT-1000				503C-D1	
C15	800			EF-001	MFT-1000				503C-D1	
C16	33			SI33NP0	TCZ-33	Z029	NP0K-330	ZT-5433	5TCC-Q33	
C17	100			BPD-0001	D6-101	G042	811-101	UC-531	5GA-T1	
C18	800			EF-001	MFT-1000				503C-D1	
C19	1-3				829-3		3115-01-0R5	CT565A		
C20	1.8									
C21	5									
C22	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C23	.7-2				829-3		3115-01-0R5	CT565A		
C24	47			BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C25	800			EF-001	MFT-1000				503C-D1	
C26	47			BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C27	1-3				829-3		3115-01-0R5	CT565A		
C28	10									
C29	10									
C30	1-3				829-3		3115-01-0R5	CT565A		
C31	10									
C32	10									
C33	1.5			SI1.5NP0	TCZ-1.5	TZ04	NP0K-1R5	ZT-5515	5TCCB-V15	
C34	800			EF-001	MFT-1000				503C-D1	
C35	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C36	800			BPD-0008	DD-801	K069	801-001	DC-521	5HK-D1	
C37	800			EF-001	MFT-1000				503C-D1	
C38	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C39	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C40	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C41	600		17.141		D6-601	TP49			5GA-T6	
C42	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C43	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C44	600		17.141		D6-601	TP49			5GA-T6	
C45	470		17.142	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C46	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C47	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	Note 3
C48	120		17.106	SI120	D6-121	TP35	GP2K-121	UC-5312	5GA-T12	
C49	5000		17.44	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 4
C50	.1	200	12.49	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C51	1500		17.140	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C52	5		17.79	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	

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... 3D ... AVE. ST.
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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA FADA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	.1	200	12.49	P288-1	DF-104	CUB32P1		PT401	2TM-P1	Note 5
C54	680		17.108	S1680	D6-681	TP50	GP3K-681	UC-5368	5GA-T68	
C55	470		17.107	S1470	D6-471	TP48	GP3K-471	UC-5347	5GA-T47	
C56	.1	600	12.60	P688-1	DF-104	CUB6P1		PT2601	6TM-P1	
C57	.1	400	12.75	P488-1	DF-104	CUB4P1		PT2401	4TM-P1	
C58	2		17.59	S12.2MP0	TCZ-2.2	TZ05	NP0K-2R2		2TCCB-V22	
C59	39		17.105	S139	D6-390	TP25	GP1K-390	UC-5439	5GA-Q39	
C60	10000		17.80	BPD-01	DD-103	K062	811-01	DC-511	5HK-B1	Note 6
C61	620	500	17.125							
C62	.0039	400	12.79	P688-004	D6-392	CUB6D4	GP2-333-392	PT624	6TM-D4	
C63	.01	400	12.73	P488-01	D6-103	CUB4R1	GP2-333-103	PT411	4TM-S1	
C64	.0047	600	12.68	P688-0047	D6-472	CUB6D47	GP2-333-472	PT2347	6TM-D47	
C65	.0047	400	12.68	P688-0047	D6-472	CUB6D47	GP2-333-472	PT2347	6TM-D47	Note 5
C66	.022	400	12.83	P488-022	DF-203	CUB4S22	817-02	PT4122	4TM-S22	
C67	.0047	400	12.68	P688-0047	D6-472	CUB6D47	GP2-333-472	PT2347	6TM-D47	
C68	.047	400	12.67	P488-047	DF-472	CUB4S47		PT1447	4TM-S47	
C69	.022	400	12.83	P688-022	DF-203	CUB4S22	817-02	PT4122	4TM-S22	
C70	10000		17.80	BPD-01	DD-103	K062	811-01	DC-511	5HK-B1	
C71A	.002							PT622		
B	.005		•167.1	•PA-119	•PC-100	•115TM1	•1405-01	PT625	•101C1	
C	.005							PT625		
C72	.0047	600	12.83	P688-0047	D6-472	CUB6D47	GP2-333-472	PT2347	6TM-D47	
C73	.047	400	12.67	P488-047	DF-503	CUB4S47		PT1447	4TM-S47	
C74	.1	400	12.75	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C75	1000		17.109	S11000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C76	1000		17.109	S11000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C77	.01	400	12.73	P488-01	D6-103	CUB4R1	GP2-333-103	PT411	4TM-S1	
C78	.0047	400	12.68	P688-0047	D6-472	CUB6D47	GP2-333-472	PT2347	6TM-D47	
C79	.047	400	12.67	P488-047	DF-503	CUB4S47		PT1447	4TM-S47	
C80	3900	500	17.113	1454-004		BD3D39		MCB3G3	MS-3S	
C81	330	500	17.69	1469-00035		5R5T33				Note 3
C82	50		17.49							
C83	270	500	17.123	1469-0003		5R5T27		MCB2A1	MS-2S	
C84	390	500	17.38	1469-0004		5R5T39		MCB2A5	MS-3S	
C85	100	1000	17.129	14681-HV-0001		5P15T1	HV5KV-101	MCK310	10GA-T1	
C86	.047	600	12.86	P688-047		CUB6S47		PT6147	6TM-S47	
C87	6800		17.35	S16800	D6-682	TP66	GP2-333-682	UC-5268	5HK-D68	
C88	.047	400	12.67	P488-047		CUB4S47		PT1447	4TM-S47	
C89	500	30000	17.118	HV30C	TV3-503	MMU30T5	413	HV30035A	30DK-T5	
C90	.47	200	12.82	P288-47		CUB2P47		PT1247	2TM-P47	
C91	.22	400	12.77	P488-22		CUB4P22		PT4022	4TM-P22	
C92	.22	400	12.77	P488-22		CUB4P22		PT4022	4TM-P22	
C93A	10000			BPD-ZX01	DD3-103	DK083	811-01	DC-511	5HK-B21	
B	10000						811-01	DC-511		
C94	56	1500	17.122							Note 7

Note 1. C2 is part of C3 in some models.
Note 2. In some models C3A is 60MFD, C3B is 20MFD and C3C is 10MFD.
Note 3. Not used in all Models.
Note 4. Some models use .01MFD in this application.
Note 5. Not used in model U1700CD.
Note 6. When ratio det. transformer part #37.230 is used, C61 is 330MMF.
Note 7. Alternate yokes use 43MMF in this application (part #17.132).
* Items C71A, C71B, C71C, R70A, R70B, R70C are combined in one unit. Some models use separate units in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FADA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1 Meg	½	52.66	* QJ-168	RTV-110	SBB-510	UF16L ‡†	Vert. Hold (Panel)
B	50KΩ	½					UR54L ‡	Horiz. Hold (Rear)
R2A	500KΩ	½	52.70	**QJ-436	RTV-401		UF55A ‡††	Tone (Panel) See note
B	50KΩ	½					UR54L ‡	Brightness-Rear
R3A	750Ω	2	52.64	•QJ-270	RTV-109		WF75L-T25L	Contrast tapped @ 500Ω
								(panel) wire wound
B	500KΩ	½					UR55A ■	Volume (rear)
C	Switch						US-28	Attach to R3B
R4A	5000Ω	2	52.68	WK-5000	A43-5000	VK-135	R5000L	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R4A
R5A	2.5Meg	½	52.24	QU1-239	A47-2.5Meg-B	AB-83	SU-565	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A
R6A	2.5Meg	½	52.74	QU1-239	A47-2.5Meg-B	AB-83	SU-565	Focus
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A

Note on Model U1770CD R2A is omitted and R2B changes to Part No. 52.69.
• CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-137 & P1-126 (Panel)
B11-123 & R1-212 (Rear)
••CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B13-133 & P1-126 (Panel)
B11-123 & R1-209 (Rear)
• CONCENTRIKIT EQUIVALENT KIT K-3 BASE ELEMENTS & SHAFTS W17-105X & P4-124 (Panel)
B13-133 & R1-212 (Rear) & SWITCH 76-1.
† Universal replacement (Mallory exact duplicate Part No. UE-1801)
†† Universal replacement (Mallory exact duplicate Part No. UE1425)
■ Universal replacement (Mallory exact duplicate Part No. UE22W3)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FADA PART No.	IRC PART No.	NOTES
R7	270Ω	½		BTS-270	
R8	47Ω	½		BTS-47	
R9	470Ω	½		BTS-470	
R10	10KΩ	½		BTS-10K	
R11	3900Ω	½		BTS-3900	
R12	33KΩ	½		BTS-33K	
R13	2.2Meg	½		BTS-2.2Meg	
R14	1.8Meg	½		BTS-1.8Meg	
R15	470Ω	½		BTS-470	
R16	10KΩ	½		BTS-10K	
R17	180KΩ	½		BTS-180K	
R18	10KΩ	½		BTS-10K	
R19	10KΩ	½		BTS-10K	
R20	4700Ω	½		BTS-4700	
R21	470Ω	½	32.30	BTS-470	
R22	470Ω	½	32.30	BTS-470	
R23	470Ω	½	32.30	BTS-470	
R24	22KΩ	½	32.15	BTS-22K	
R25	470Ω	½	32.30	BTS-470	
R26	47Ω	½	32.197	BTS-47	
R27	470Ω	½	32.30	BTS-470	
R28	15KΩ	½	32.13	BTS-15K	
R29	470Ω	½	32.30	BTS-470	
R30	47Ω	½	32.197	BTS-47	
R31	470Ω	½	32.30	BTS-470	
R32	220Ω	½	32.5	BTS-220	
R33	470Ω	½	32.30	BTS-470	
R34	10KΩ	½	32.11	BTS-10K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FADA PART No.	IRC PART No.	NOTES
R35	5600Ω	½	32.126	BTS-5600	
R36	1 Meg	½		BTS-1 Meg	Note 1
R37	82Ω	½	32.125	BTS-82	
R38	39KΩ	2	32.660	BTS-39K	
R39	39KΩ	2	32.660	BTS-39K	
R40	50000Ω	10	117.80		
R41	470KΩ	½	32.93	BTS-470K	
R42	330KΩ	½	32.305	BTS-330K	
R43	22KΩ	½	32.183	BTS-22K	
R44	39KΩ	1	32.103	BTA-39K	
R45	680KΩ	½	32.35	BTS-680K	
R46	1 Meg	½	32.33	BTS-1 Meg	
R47	47KΩ	½	32.15	BTS-47K	
R48	4700Ω	1	32.74	BTA-4700	
R49	330Ω	½		BTS-330	Note 2
R50	15KΩ	½	32.13	BTS-15K	
R51	33KΩ	½	32.13	BTS-33K	
R52	22KΩ	½	32.15	BTS-22K	
R53	10 Meg	½	32.99	BTS-10 Meg	
R54	220KΩ	½	32.18	BTS-220K	
R55	470KΩ	½	32.93	BTS-470K	
R56	68Ω	1	32.115	BTA-680	
R57	470Ω	1	32.199	BTA-470	
R58	1.8Meg	½	32.208	BTS-1.8Meg	
R59	33KΩ	½	32.14	BTS-33K	
R60	10KΩ	½	32.11	BTS-10K	
R61	47KΩ	½	32.15	BTS-47K	
R62	1.8Meg	½	32.208	BTS-1.8Meg	
R63	39KΩ	½	32.103	BTA-39K	
R64	6.8Meg	½	32.46	BTS-6.8Meg	
R65	1000Ω	½	32.8	BTS-1000	
R66	2200Ω	½	32.60	BTS-2200	
R67	12KΩ	½	32.143	BTS-12K	
R68	68KΩ	1	32.411	BTA-68K	
R69	2200Ω	½	32.60	BTS-2200	
R70A	22KΩ	½		BTS-22K	
B	8200KΩ	½	• 167.1	BTS-8200	
C	8200KΩ	½		BTS-8200	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FADA PART No.	IRC PART No.	NOTES
R71	1.5Meg	½	32.147	BTS-1.5Meg	
R72	2.2Meg	½	32.94	BTS-2.2Meg	
R73	47KΩ	½	32.15	BTS-47K	
R74	1 Meg	½	32.33	BTS-1 Meg	
R75	8200Ω	½	32.77	BTS-8200	
R76	2.2Meg	½	32.34	BTS-2.2Meg	
R77	330Ω	½	32.57	BTS-330	
R78	5000Ω	10	117.80	1 3/4A-5000	
R79	47KΩ	½	32.15	BTS-47K	
R80	560Ω	½	32.68	BTS-560	
R81	560Ω	½	32.68	BTS-560	
R82	1000Ω	½	32.8	BTS-1000	
R83	100KΩ	½	32.69	BTS-100K	
R84	100KΩ	½	32.69	BTS-100K	
R85	4.7Meg	½	32.98	BTS-4.7Meg	
R86	470KΩ	½	32.92	BTS-470K	
R87	1500Ω 5%	½	32.265	BTS-1500 5%	
R88	5600Ω	½	32.126	BTS-5600	
R89	100KΩ	½	32.89	BTS-100K	
R90	47KΩ	½	32.15	BTS-47K	
R91	150KΩ	½	32.90	BTS-150K	
R92	3900Ω	½	32.202	BTS-3900	
R93	15KΩ	2	32.655	BTS-15K	
R94	470KΩ	½	32.92	BTS-470K	
R95	100Ω	½	32.2	BTS-100	
R96	100Ω	2	32.635		
R97	39KΩ	2	32.660	BTS-39K	
R98	33KΩ	2	32.659	BTS-33K	
R99	6800Ω	½	32.10	BTS-6800	
R100	5.1Ω	½	32.157		
R101	100KΩ	1	32.373	BTA-100K	
R102	500Ω	20	117.74	2D-500	
R103	500Ω	20	117.74	2D-500	
R104	500Ω	20	117.74	2D-500	
R105	2500Ω	25	117.83		
R106	50Ω	10	117.59	1 3/4A-50	
R107	220KΩ	1	32.375	BTA-220K	Note 2
R108	22Ω	½		BTS-22	Note 3

• Items R70A, R70B, R70C, C71A, C71B, C71C are combined in one unit.
Note 1. Used in Model U1700CD only.
Note 2. Not used in all models.
Note 3. Used in UHF-VHF models only.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA FADA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ 1.82A	700VCT @ 220ADC	5VAC @ 3A	42.61	P-8166 ①	P-3059	R-37BC	30IT10	P9719	T-26R21
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @ 1.2A	6.3VAC @ 7.8A								

① Parallel and phase 6.3V 5A windings and use as Sec. 4.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA FADA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	42.53	A-8111	A-3000	A-97X①	209T1	H6700	24A87
T3	Horiz.Output Trans.	37.272	A-8132 * &	*HV-9 &	*D-19 &	225T1 * &	FB413 * &	FLY-12* &
		37.264 ②	WC-5③	MWC-1④	WC-11 ⑤	214R1 ⑥	RF800 ⑦	WC-20④
T4	Vert. Output Trans.	42.62	A-8123	A-105X	222T1	Z1804	26S52	Osc. Coils
		42.65 ⑧						44MC VHF
T5A	Yoke-Horiz. (15MH)	37.273	DY-9A	MDF-73	Y-17-1	21ID2	DF602	Y-7
B	Yoke-Vert.(40.5MH)	37.265⑦						
		37.275⑧						
T6	Horiz.Linearity (1.2-5MH) (Tapped)	37.244	WC-8	MWC-5⑧		209R1		WC-15⑥
T7	Width (.5-2MH)	37.248	WC-7	MWC-2⑧	WC-12 ⑨	206R1		WC-17

① Drill one new mounting hole.
② Alternate horizontal output transformer.
③ Remove mounting bracket and mount on side of high voltage cage.
④ Drill new mounting holes.
⑤ Mount on side of high voltage cage.
⑥ Alternate vertical output transformer.
⑦ Alternate yoke.
⑧ Enlarge mounting hole.
⑨ Connect to coded red and green terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
	8	8	IB3 Rect. Plate Lead	IB3 Rect. Plate Lead	IB3 Rect. Plate Lead	8	IB3 Rect. Plate Lead
	7	7	9	9	9	7	9
	6	6	8	8	8	6	8
	5	5	NC	7	7	5	7
	4	4	5	5	5	4	5
	3	3	4	4	4	3	4
	2	2	3	3	3	2	3
	1	1	1	1	1	1	1
Connect Width Coil Across →		Pri.WC-5 Across 1 & 2	Pri. MWC-1 Across 1 & 3	Pri. WC-11 Across 1 & 3	Pri. 214R1 Across 1 & 3	Pri. RF800 Across 1 & 2	Pri. WC-20 Across 1 & 3
Special Notes →		⑩	⑪	⑩	⑩	⑩	⑩

⑩ Remove original width coil and connect secondary of replace ment width coil to AFC. If the picture is out of phase, reverse secondary.
⑪ Connect cathode of damper terminal #8. Connect linearity coil in plate circuit as shown on instruction sheet packed with unit. (Do not use center tap). Remove original width coil & C87 from circuit. Connect secondary of MWC-1 to AFC. If picture is out of phase, reverse secondary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA FADA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	4.5KΩ	3.2Ω	42.57	A-3877	A-2930	S-3X	Z1000	T3-24S51	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA FADA PART No.	VIKING PART No	QUAM PART No.	NOTES
SP1	10"	PM	3.3Ω	107.58 107.47 ①	10J11	10A31	① Alternate PM Speaker

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FADA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coupling Loop	0Ω						
L2	UHF Ant. Coupling Loop	0Ω						
L3	UHF RF Coupling	0Ω						
L4	Fil. Choke	0Ω						
L5	UHF Osc. Tank Coil	0Ω						
L6	UHF Osc. Tank Shunt Coil	0Ω						
L7	UHF Osc.Coil	0Ω	CT					
L8	Harmonic Osc. Coupling	0Ω						
L9	UHF Osc. Doubler Coupling	0Ω						
L10	RF Choke	.2Ω						
L11	UHF IF Output Coil	.1Ω	0Ω					
L12A	VHF Ant.,RF, Mixer Grid & Osc. Coils	0Ω						
B	44MC VHF Strip	0Ω						Used in UHF position only
L13	Neutr.Coil	0Ω						
L14	Coupling Coil	0Ω						
L15	Fil. Choke	0Ω						
L16	RF Choke	0Ω						
L17	Conv. Plate	0Ω	0Ω					
L18	1st. Video IF	.1Ω	.1Ω	37.276	17-4531 †		6234	
L19	2nd.Video IF	.3Ω	.3Ω	37.277	17-4531 •		6233	Includes trap
L20	Fil. Choke	0Ω		37.59	19-3001	TV-189	6175	.6 Microhenry
L21	3rd. Video IF	.2Ω	.2Ω	37.278			6233	Includes trap
L22	Fil. Choke	0Ω		37.59	19-3001	TV-189	6175	.6 Microhenry
L23	4th.Video IF	.3Ω	.3Ω	37.279	17-4531 †		6234	
L24	Series Peaking Coil	5Ω		37.234	19-3125		6153	130 Microhenries
L25	Shunt Peaking Coil	18Ω		37.235	19-3660	TV-188	4650	600 Microhenries
L26	Series Peaking Coil	6.5Ω		37.236	19-3180 ■	TV-184 ■	6180 ■	190 Microhenries, wound on 18KΩ resistor
L27	Shunt Peaking Coil	8Ω		37.237	19-3250	TV-185	6181	24 Microhenries
L28	Sound IF	1.9Ω	1.9Ω	37.252	19-3445 •	TV-113	6203	
L29	Ratio Det.	5.5Ω	1.8ΩCT	37.253 *	17-3497	TV-115	6205	Tertiary winding-.8Ω
L30	Horiz. Osc.	48Ω		37.253	19-1576	TV-183	6210	

† Deluxe trap and drill mounting holes.
• Drill mounting holes.
■ Parallel with 18KΩ resistor.
* Some models may use ratio det. part #37.230.

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	FADA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L31	.220A	62Ω	1.5HY	42.56	C-2326 ①	C-2996 ①	C-17X ①	C5037 ①	T-26C44 ①

① Drill one new mounting hole.

FUSES

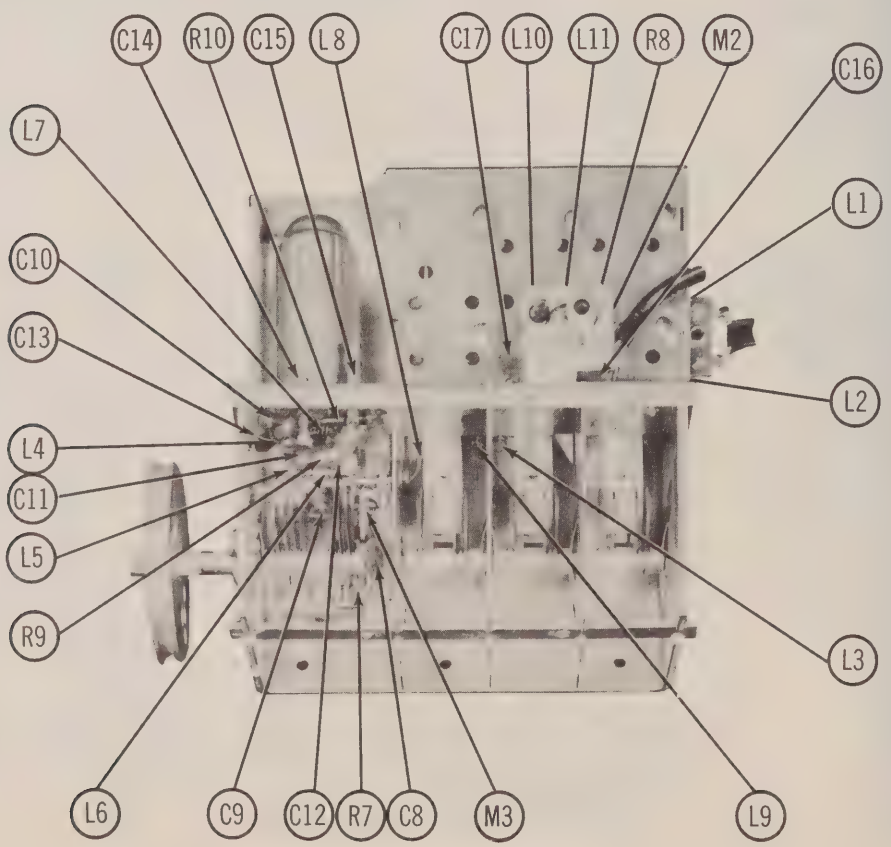
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FADA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG P/T	1/4A 250V			318.250 (3AG P/T-1/4A)		GJV 1/4	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		FADA PART No.	SYLVANIA PART No.	FEDERAL PART No.	
M2	1N82		1N82 or 1N82A		
M3	G7B		1N109		

MISCELLANEOUS

ITEM No.	PART NAME	FADA PART No.	NOTES
M4	Dial Light		#47 (used with UHF models only)
M5	Tuner	42.79	UHF
M6	Tuner	42.78	VHF
M7	Switch		UHF/VHF changeover
M8	Switch		AGC area selector
M9	Centering Magnet	112.37	
M10	Ion Trap	112.39	
B2	Trimmer Cap.	132.18	Horiz. Drive (25-280MMF)
	Cabinet	97.407	
	Knob	142.94	Outside shaft
	Knob	142.93	Inside shaft
	Knob	142.103	Channel Selector
	Knob	142.98	Fine tuning
	Knob	142.97	UHF Dial
	Knob	142.95	Brightness
	Safety Glass	92.463	



UHF TUNER

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light, substitute V20. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PICTURE

Substitute V20. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M1. Check by substitution V16, V17, V18 and V19. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check R100 , R101, C89, T3, T5A, C86, R97, R98 and other associated circuit components.	Check R88, R 91, R93, R94, C81, C84 and other associated circuit components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V18, V19 and V20. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V17, V18, V19 and V20. Check R100 , R101, R97, R98, C89, C86, T3, T5A, picture tube and other associated circuit components.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO SOUND NO PICTURE

Check by substitution V2, V3, V4, V5, V6, V7 and V8. Check associated circuit components. In case of UHF check V1 and associated components.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

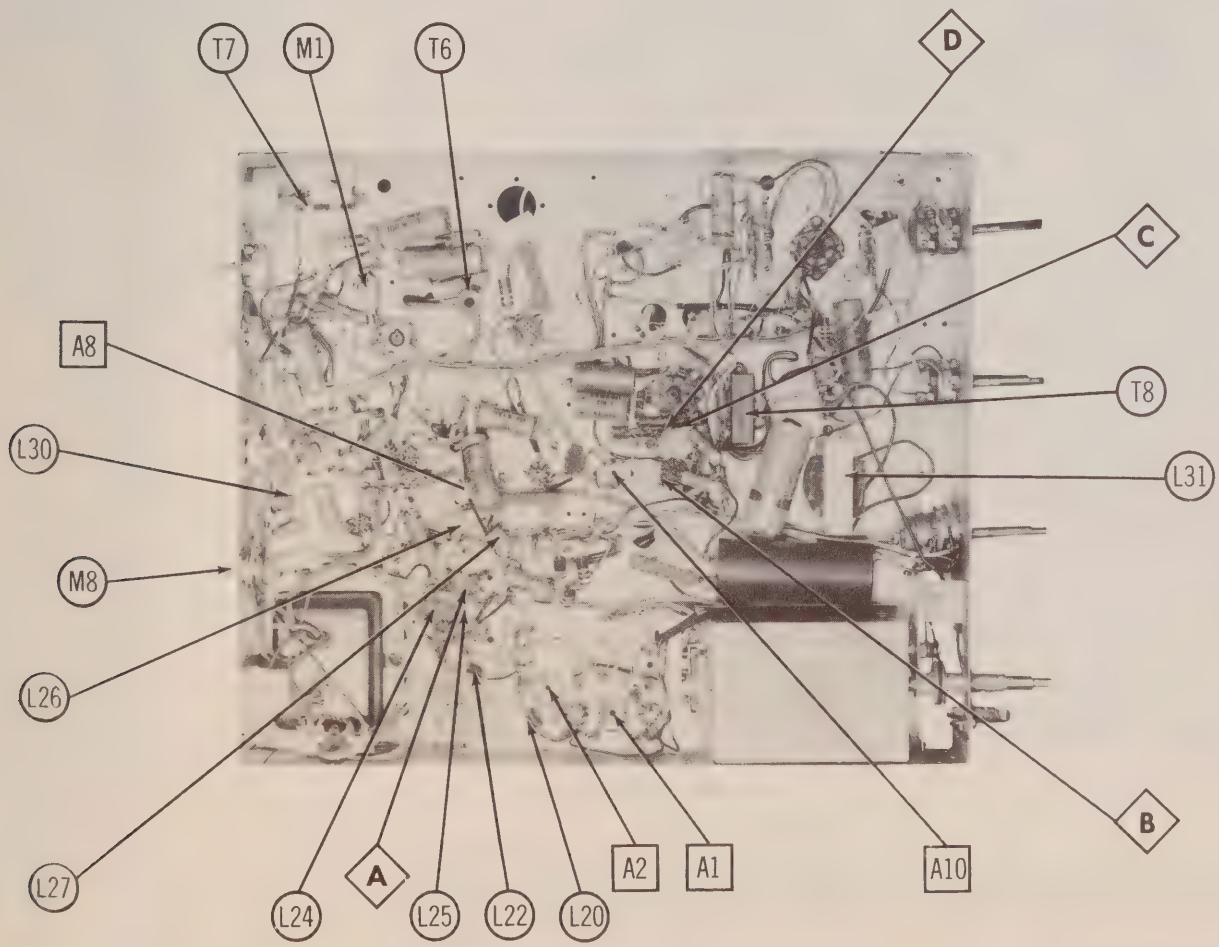
KEYSTONE EFFECT

Check T5, R80, R81, R82 and C94.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at time, thru the small hole in the cabinet to the right of the channel selector shaft.

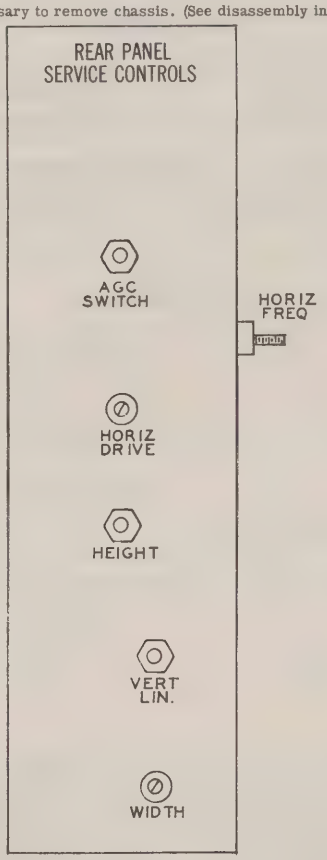
PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L30) until picture synchronizes horizontally. For location, see tube placement chart .

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF detector buzz, adjust the ratio detector secondary (L29) located on top of chassis. (See tube placement chart).

FUSES

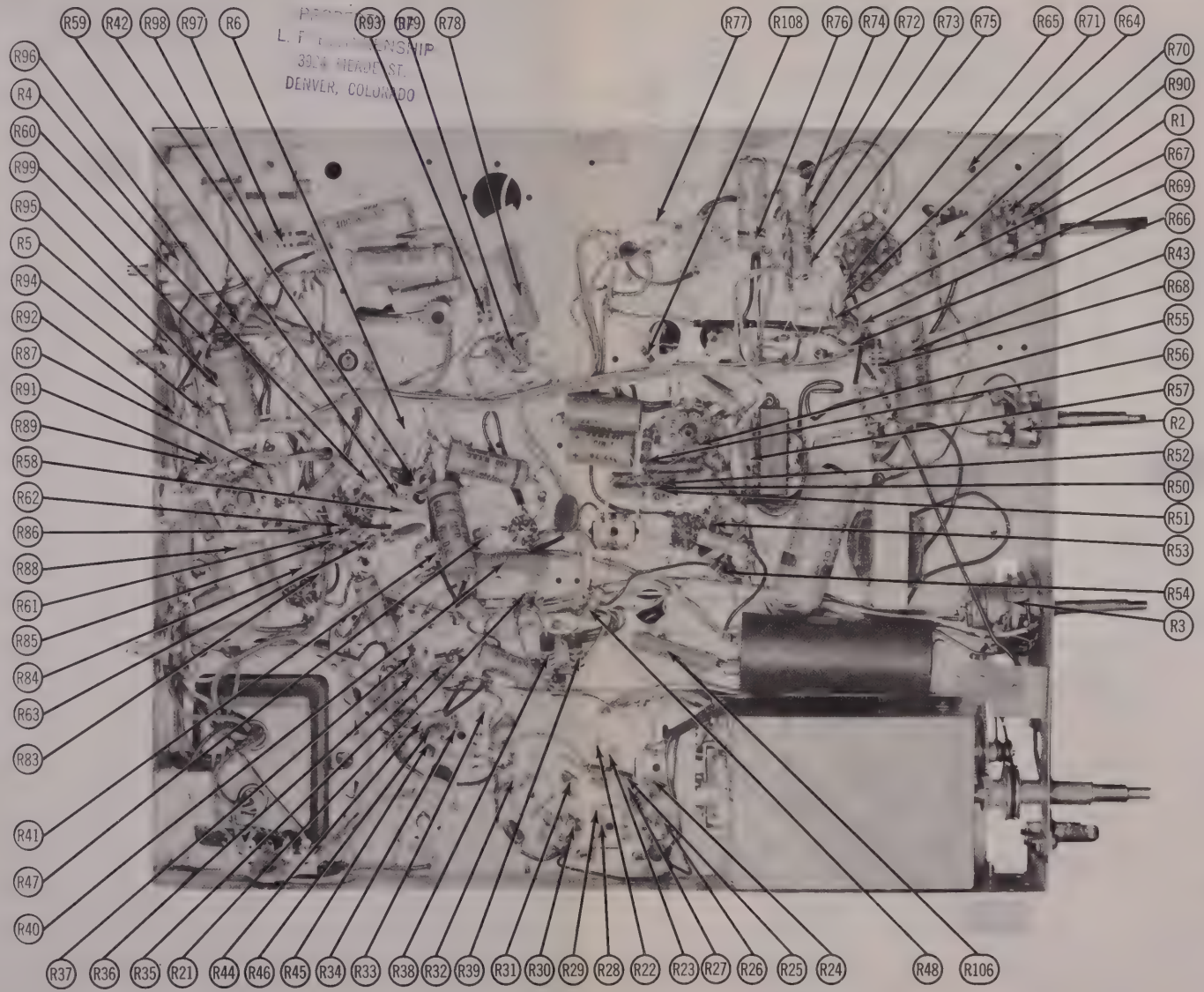
One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 9 push on type control knobs from front panel.
2. Remove 6 wood screws. Remove rear cover.
3. Disconnect built-in antenna.
4. Remove 4 wood screws. Remove antenna bracket from cabinet.
5. Disconnect speaker leads, CRT socket, yoke plug and HV plug.
6. Remove 2 chassis mounting bolts. Remove chassis.
7. Remove 4 chassis bolts. Remove chassis from mounting board.
8. Remove 2 speaker nuts. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FIRESTONE
MODELS 4-A-121, 4-A-122

PROPERTY OF
L. F. BL[illegible]KENSHIP
3924 MEADE ST.
DENVER, COLORADO

FIRESTONE
MODELS 4-A-121, 4-A-122

TRADE NAME	Firestone Models 4-A-121, 4-A-122
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron, Ohio
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Four)	Types 12AU6 Conv., 12AV6 Det. -AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial. Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400%Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1620KC	"	"	A3	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

FIRESTONE MODEL 4-A-121

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12AU6	12AU6	7BK	
V2	Det. -AF Amp	12AV6	12AV6	7BT	
V3	Audio Output	50C5	50C5	7CV	
V4	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	50	150	N8677	PRS1010D4A		BBRT5515C		2N521	TVA-3436	Blue
B	50	150						TC26		Red
C	20	15								Green
C2	50		N6385	SI50	D6-500	TP30		UC-545	5GA-Q5	
C3	100		N6015	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C4	.003	600	N2063	P688-003	D6-302	CUB6D3	GP2-333-302	PT623	6TM-D3	
C5A	5000		*N8215	*PA-112-2	*PC-71	*112TM2	*1406-02		*104C5	
B	250									
C										
C6	.01	400	N1344	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C7	3200									Note 1
C8	.05	400	N1346	489ZX-05	DF-503	PJ4S5		PT415	4TM-S5	
C9	.05	200	N1345	P288-05	DF-503	PJ2S5		PT415	2TM-S5	

* Items C5A, C5B, C5C, R5A and R5B are combined in one unit. .
When replacing items separately, items C5B and C5C should total 250MMF.
Note 1. Not used in all Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	N8674	Q13-139	A47-2Meg-Z	AB-76	U55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A

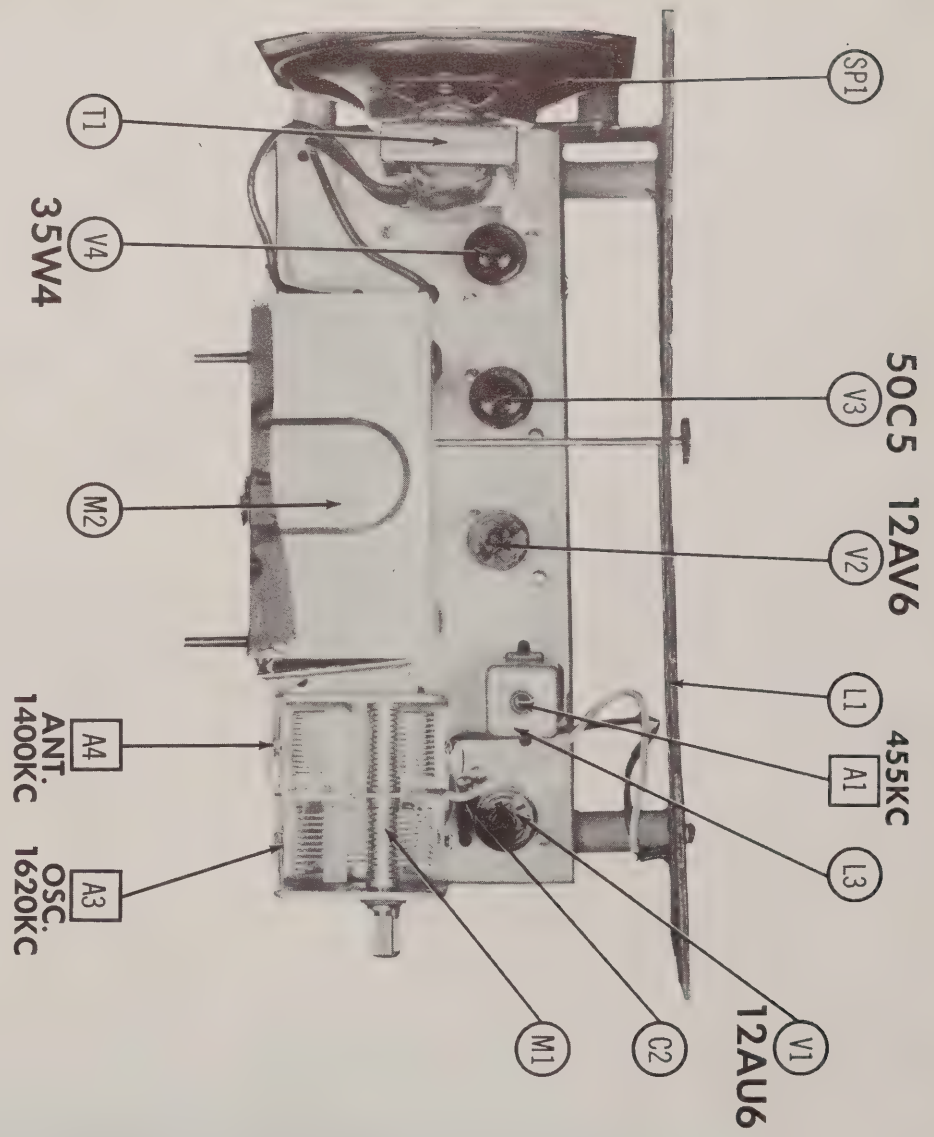
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R2	2.2Meg	½	N-4277	BTS-2.2Meg	
R3	6.8Meg	½	N-4028	BTS-6.8Meg	
R4	68Ω	2	N-6014		
R5A	220KΩ	½	♦N-8215	BTS-220K	
B	470KΩ	½		BTS-470K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R6	180Ω	½	N-4067	BTS-180	
R7	33Ω	½	N-4022		
R8	2200Ω	½	N-4896	BTS-2200	

♦ Items R5A, R5B, C5A, C5B, C5C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	1.9KΩ	2.9Ω	Part of Spkr.	A-3332①	A-3025①	S-2X ①	Z1101①	TS-24S50①	① Bend mounting tabs down, file out slots, mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	FIRESTONE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	2.9Ω	N7824	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2.3Ω		N-9792				
L2	Osc. Coil	1.1Ω	7.5Ω	N-8681				Plate winding =2.6Ω
L3	IF transformer	30Ω	30Ω	N-7694	16-6758 †	BC-353 †	12-C2 †	Pri. tapped @1Ω

† Connect B+ line to pin 6 of V1.

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M1	Tuning cap	N-8675	(16-435MMF) (12-178MMF)
M2A	Clock	N-9793	Model 4-A-121
B	Clock	N-9774	Model 4-A-122
	Cabinet	# 360	White } Model 4-A-122
	Cabinet	# 490	Green }
	Cabinet	# 412	Mahogany-Model 4-A-121
	Knob	N-8899	Tuning-white
	Knob	N-9787	Tuning-green
	Knob	N-9066	Tuning-mahogany
	Knob	N-8712	Volume-white
	Knob	N-9788	Volume-green
	Knob	N-8764	Volume-mahogany
	Knob	N-9783	Clock-model 4-A-121
	Knob	N-9784	Clock-model 4-A-122

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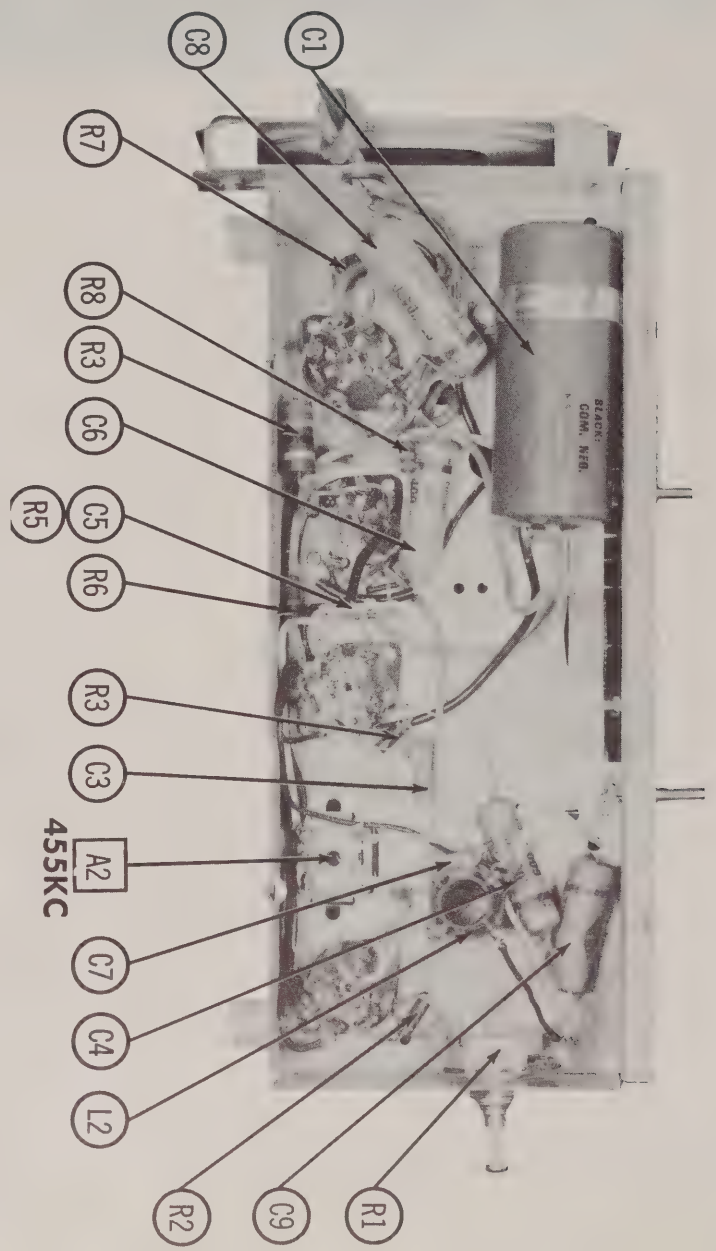
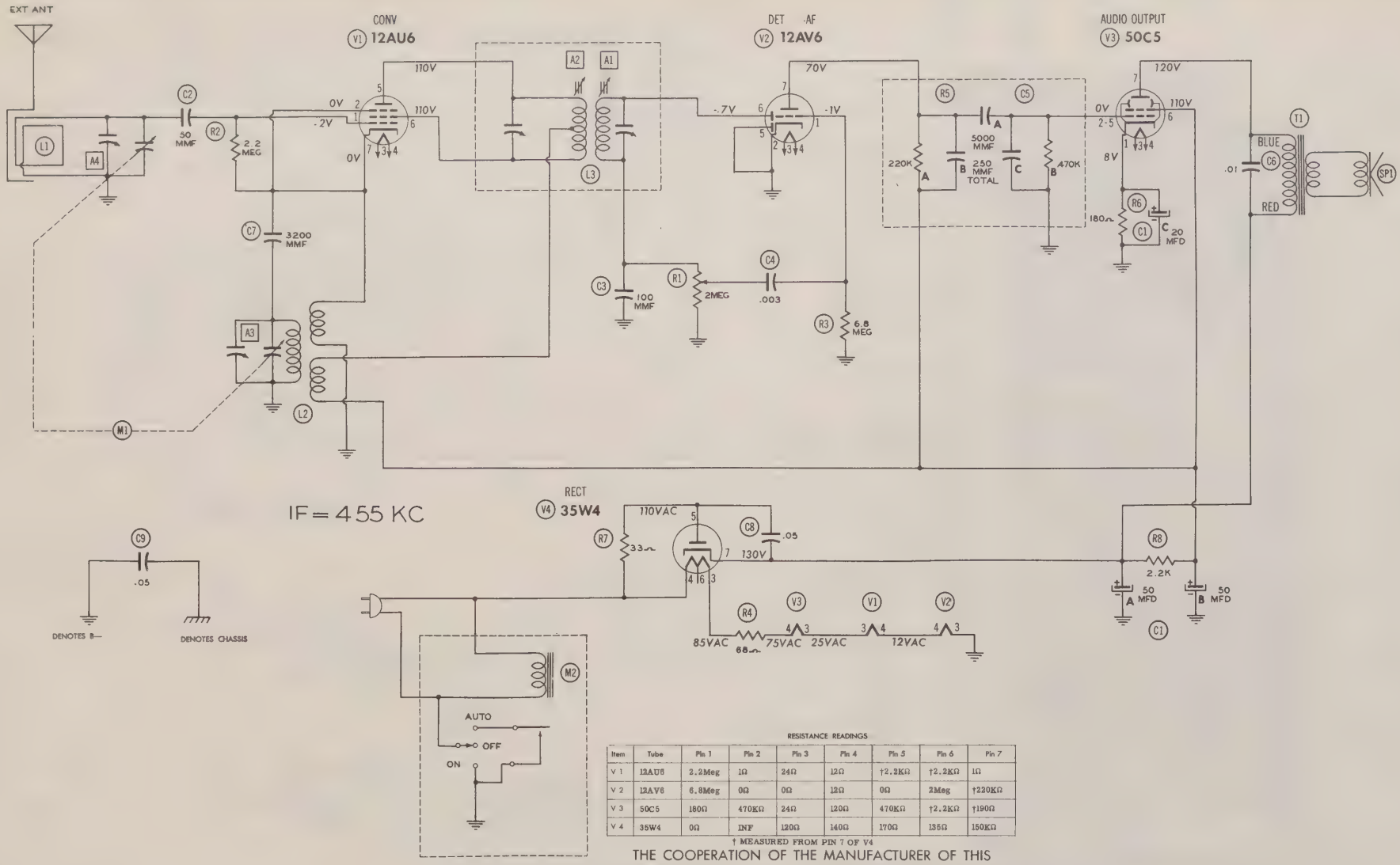
DENVER, COLORADO

CHASSIS—BOTTOM VIEW



FIRESTONE
MODEL 4-A-121

FIRESTONE
MODEL 4-A-121



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	2.2Meg	1Ω	24Ω	12Ω	†2.2KΩ	†2.2KΩ	1Ω
V 2	12AV6	6.8Meg	0Ω	0Ω	12Ω	0Ω	2Meg	†220KΩ
V 3	50C5	180Ω	470KΩ	24Ω	120Ω	470KΩ	†2.2KΩ	†190Ω
V 4	35W4	0Ω	INF	120Ω	140Ω	170Ω	135Ω	150KΩ

† MEASURED FROM PIN 7 OF V4

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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KNIGHT
MODEL SX8L727

KNIGHT
MODEL SX8L727

VOLUME CONTROL ON-OFF SWITCH

FUNCTION SELECTOR SWITCH

TUNING CONTROL

PROPERTY OF
L. F. [illegible]
DENVER, COLORADO

KNIGHT
MODEL SX8L727

TRADE NAME	Knight Model SX8L727	
SUPPLIER	Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill.	
TYPE SET	AC Operated AM-FM Superheterodyne Tuner For Custom Installations	
TUBES (Eight)	Types 6BA6 FM RF Amp., 12AT7 FM Conv., 6BE6 AM Conv., 6BA6 AM-FM IF Amp., 6AU6 2nd. FM IF Amp., 6AL5 Ratio Det., 6AT6 AM Det.-AF Amp., 5Y3GT Rectifier	
POWER SUPPLY	110-120 Volts AC	RATING .53 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	535-1700KC	FREQ. MOD. 88-108MC

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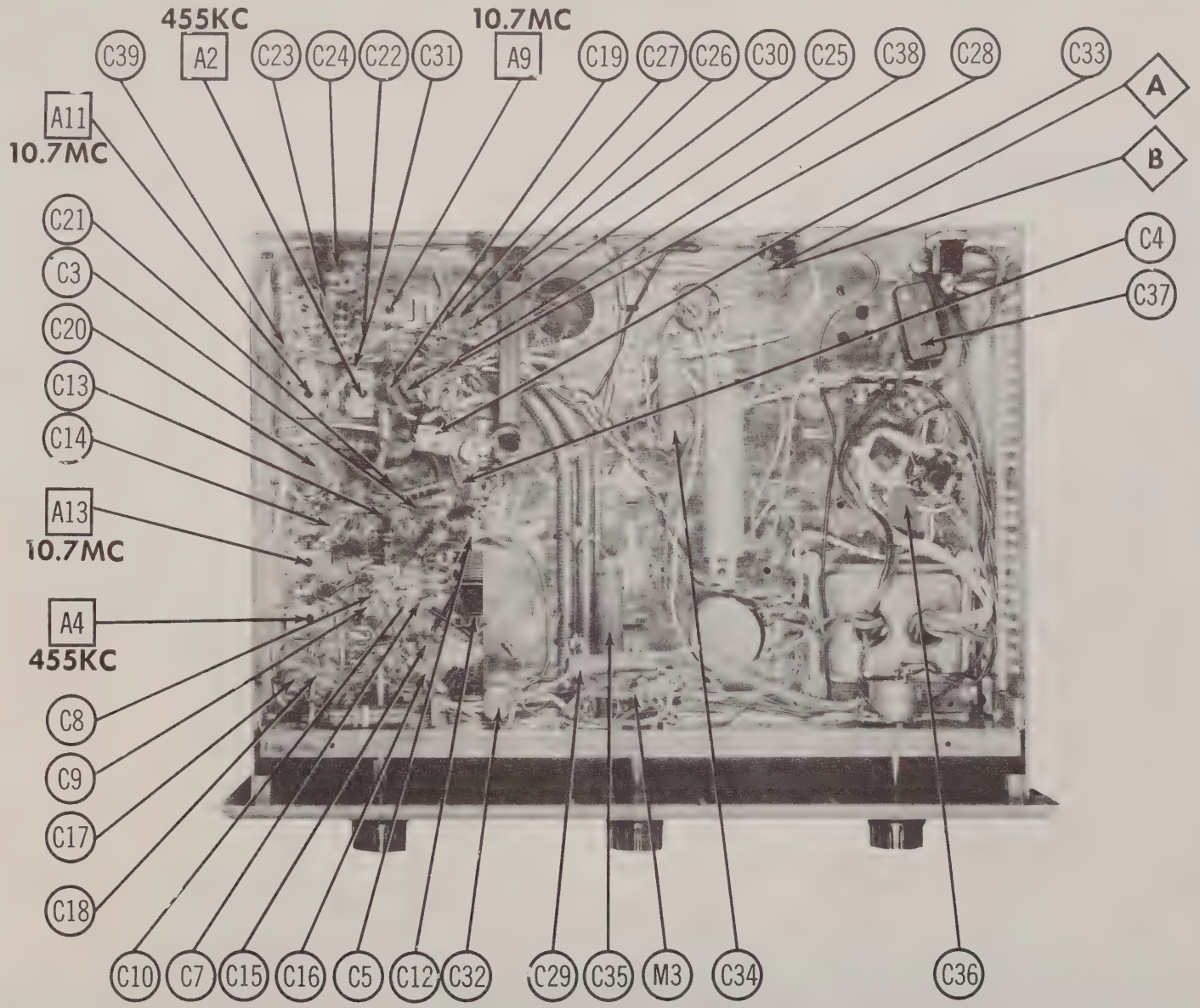
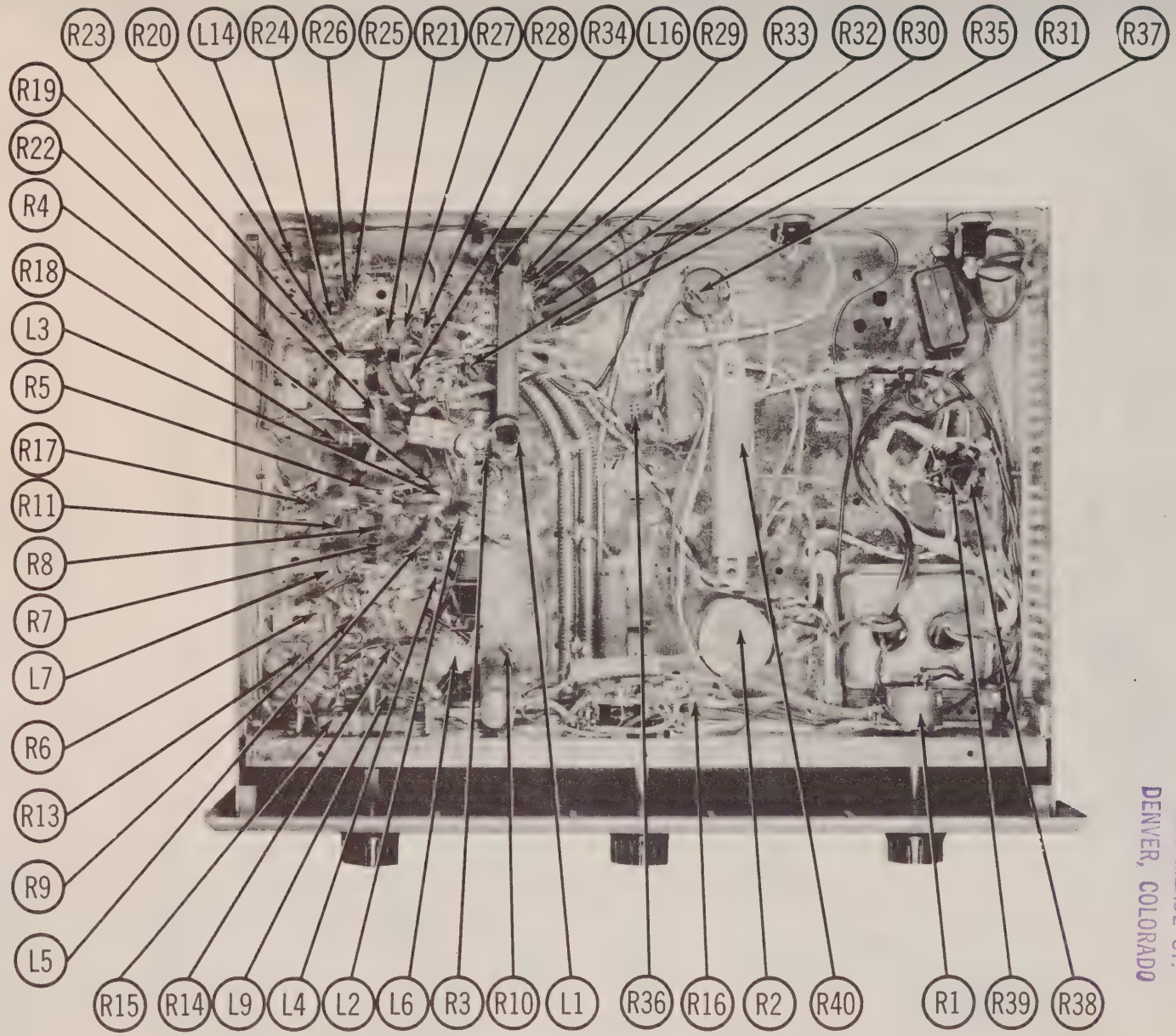


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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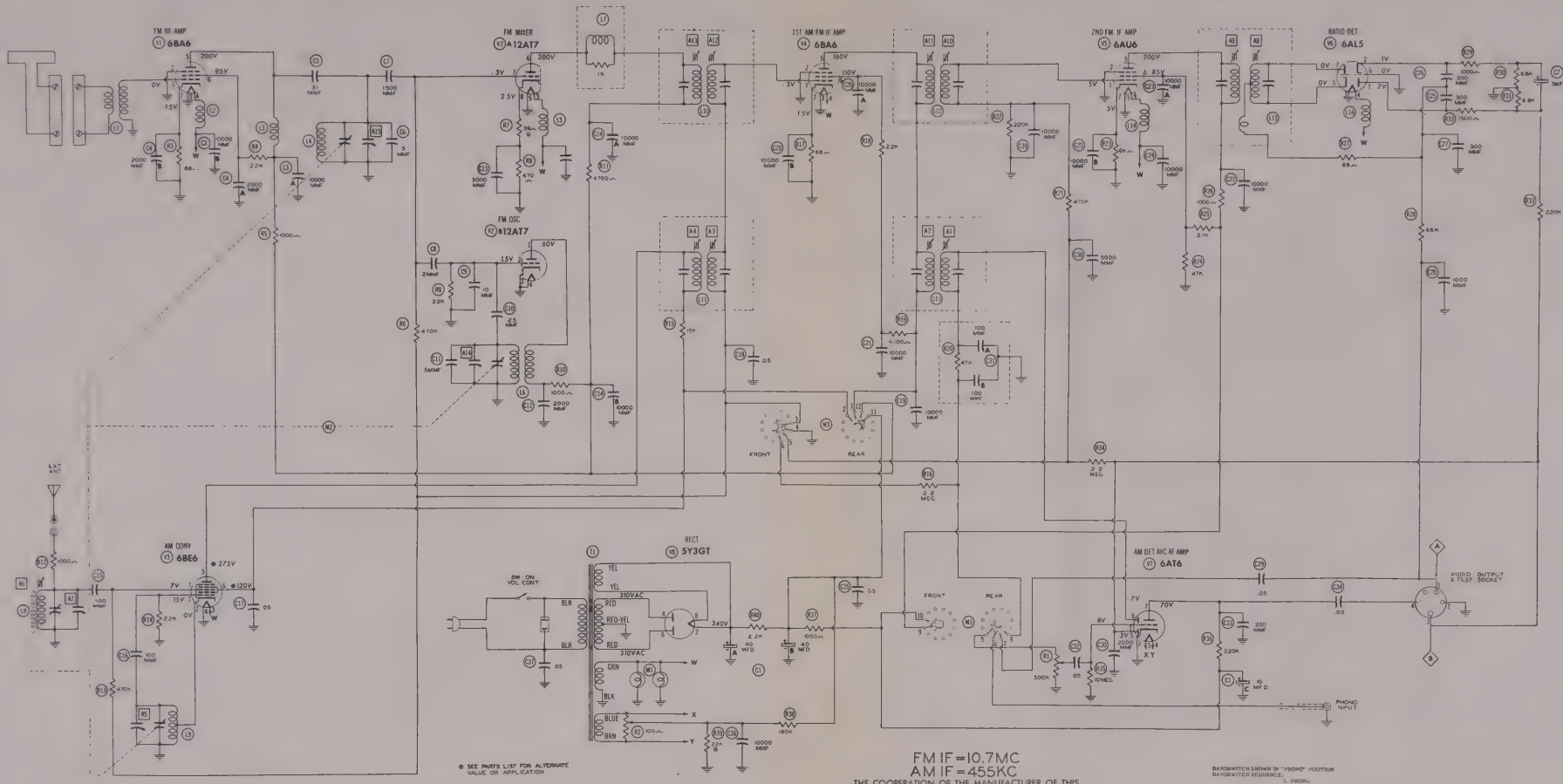
DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6 BA6	0Ω	0Ω	0Ω	.2Ω	† 3.2KΩ	† 25KΩ	68Ω		
V 2	12AT7	† 3.2KΩ	32KΩ	0Ω	0Ω	0Ω	† 7KΩ	1.2 Meg	51Ω	.2Ω
V 3	6 BE6	22KΩ	0Ω	.2Ω	0Ω	†+2.2KΩ	†+17KΩ	+3.2Meg		
V 4	6 BA6	600KΩ	0Ω	0Ω	.2Ω	† 7KΩ	† 24KΩ	68Ω		
V 5	6AU6	250KΩ	0Ω	0Ω	.2Ω	† 4.2KΩ	† 30KΩ	68Ω		
V 6	6AL5	7.5KΩ	8.3KΩ	0Ω	.2Ω	INF	0Ω	INF		
V 7	6AT6	10 Meg	0Ω	22KΩ	22KΩ	230KΩ	+550KΩ	† 225KΩ		
V 8	5 Y3GT	0Ω	200KΩ	† 2.2KΩ	100Ω	INF	100Ω	22KΩ	200KΩ	

ALL MEASUREMENTS IN FM POSITION UNLESS OTHERWISE DESIGNATED.
+ MEASURED IN AM POSITION.
† MEASURED FROM PIN 8 OF V8

1. DC voltage measurements taken with vacuum tube voltmeter
AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on resistors values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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244-6

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
With tuning gang fully closed set dial pointer to index mark just to the left of "55" on the dial.

AM ALIGNMENT

Attenuate generator output to maintain 0.5 watt output meter indication. 0.5 watt is approximately 1.4 volts deflection across the 4Ω voice coil and 2 volts across the 8Ω voice coil.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	455KC (400∿Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output.
2.	"	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	"	"	"	"	A3, A4	"
3.	5MMF	High side thru 5MMF to AM antenna socket. Low side to chassis.	1700KC	"	1700KC	"	A5	"
4.	"	"	600KC	"	600KC	"	A6	"
5.	"	"	1550KC	"	1550KC (small index mark just to right of 1500 on dial)	"	A7	Adjust for maximum output. Repeat steps 4 and 5.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (No Mod.)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
7.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A9	Adjust for maximum deflection. Repeat steps 6 and 7.
8.	"	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	"	"	A10, A11	Adjust for maximum deflection. Attenuate signal generator to maintain 1.5 volts at VTVM.
9.	"	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A12, A13	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.
Use only enough generator output to provide useable pattern on scope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	.01MFD	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓑ. Low side to chassis.	A9, A10 A11	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
7.	"	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	" "	"	"	"	A12, A13	"
8.	"	"	"	"	"	Vert. Amp. to point Ⓐ. Low side to chassis.	A8	Reconnect stabilizing capacitor C2. Adjust so that 10.7MC occurs at center of cross-over lines as in Fig. 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines. Continue with step 10.

FM RF ALIGNMENT

Attenuate signal generator to maintain -1.5 volts on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10.	Two 150Ω Carbon Resistors	Across FM antenna socket terminals with 150Ω in each lead.	108MC (Unmod)	FM	108MC	DC probe to point Ⓑ. Common to chassis.	A14	Adjust for maximum deflection. Attenuate signal generator to maintain 1.5 volts at VTVM.
11.	"	"	106MC	"	106MC	"	A15	"
12.	"	"	90MC	"	90MC	"		Check L4 with a tuning wand. If necessary, compress or expand coil for maximum deflection. Repeat steps 11 and 12 until proper RF tracking is obtained.

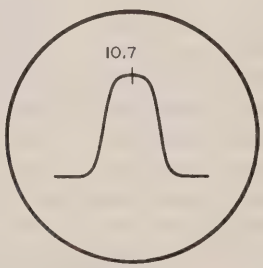


FIG. 1

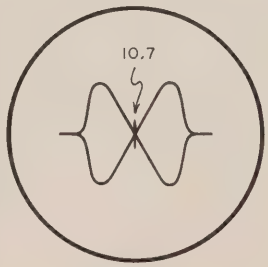


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		KNIGHT PART No.	STANDARD REPLACEMENT		
V1	FM RF Amplifier	6BA6	6BA6	7BK	
V2	FM Mixer & Osc.	12AT7	12AT7	9A	
V3	AM Converter	6BE6	6BE6	7CH	
V4	1st. AM FM IF Amp.	6BA6	6BA6	7BK	
V5	2nd. FM IF Amp.	6AU6	6AU6	7BK	
V6	Ratio Detector	6AL5	6AL5	6BT	
V7	AM Det.-AF Amp.	6AT6	6AT6	7BT	
V8	Rectifier	5Y3GT	5Y3GT	5T	

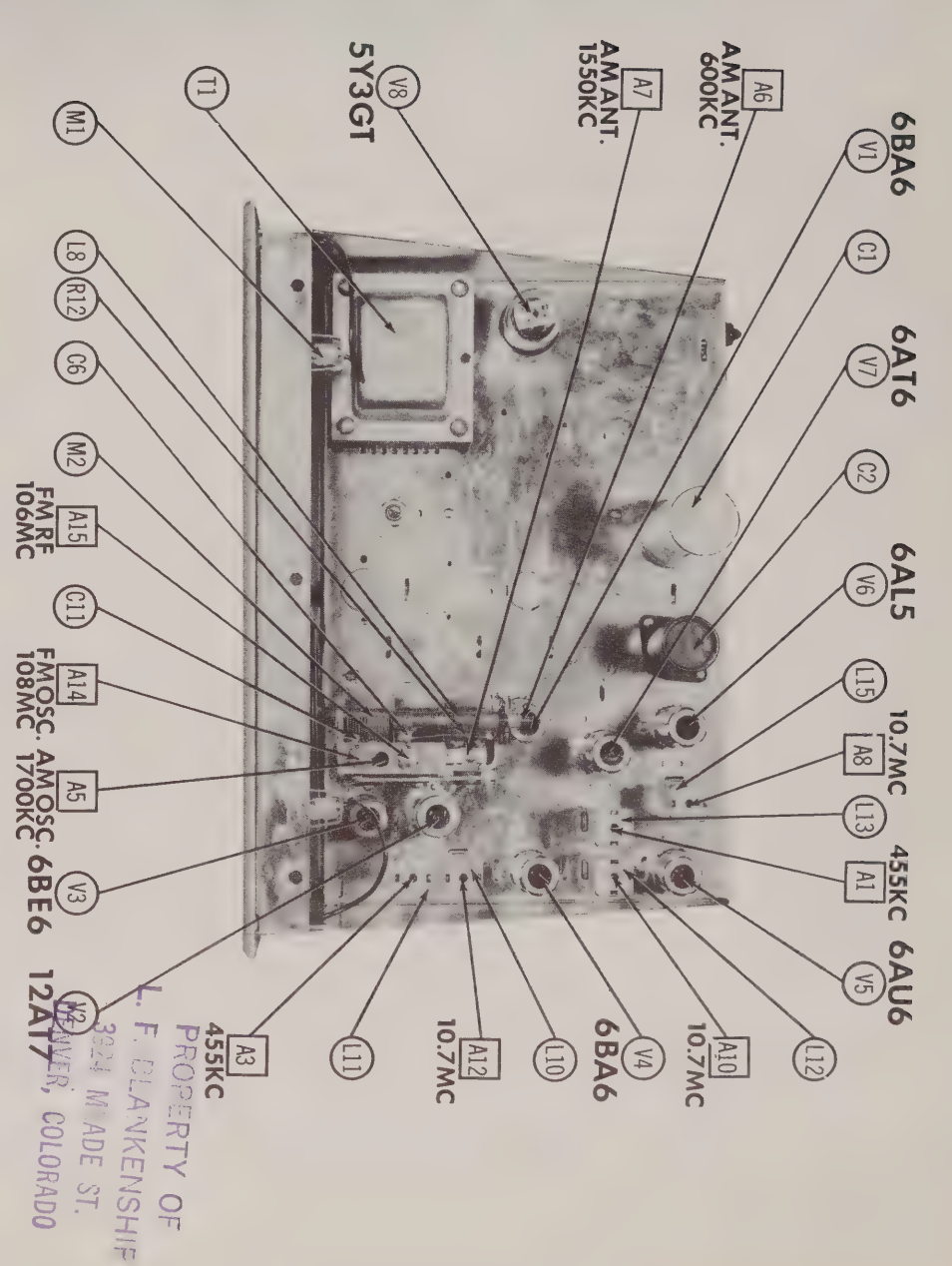
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	450		AFH3-43		C034		FP376.8	TVL-3785	
B	■40	450								
C	▲10	450								
C2	5	250		PRS250/4		BR425		TC50X	TVA-1501	
C3A	10000			BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		
C4A	2000			BPD-2X002	DD2-202	DK072	812-002	DCD-522	5HK-2D2	
B	2000									
C5	51									
C6	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C7	1500			SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C8	2									
C9	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C10	25			SI25NP0	TCZ-25	TZ15	NP0K-250	ZT-5425	5TCC-Q25	
C11	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C12	2000			SI2000	D6-202	TP56	GP2-333-202	UC-522	5HK-D2	
C13	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C14A	10000			BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		
C15	500			SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C16	100			SI100NP0	TCZ-100	TZ30	NP0-333-101	ZT-531	5TCC-T1	
C17	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C18	.05	200		P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C19	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C20A	10000			BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		
C21	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C22	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C23A	10000			BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		
C24	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C25	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
C26	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
C27	300			SI300	D6-301	TP42	GP2K-301	UC-533	5GA-T3	
C28	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C29	.05	200		P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C30	2000			SI2000	D6-202	TP56	GP2-333-202	UC-522	5HK-D2	
C31A	100			♦PA-97-1	♦PC-50	♦111TM1	♦1403-01	UC-531	♦100C1	
B	100							UC-531		
C32	.05	200		P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C33	250	500		1468-00025	D6-251	5W5T25	GP2K-251	MC240	1FM-325	
C34	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C35	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C36	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C37	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C38	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C39	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	

♦ Items C31A, C31B, R20 are combined in one unit.

CHASSIS—TOP VIEW



PROPERTY OF
L. F. BLANKENSHIP
3824 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	KNIGHT PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	A9.315-A	Q13-133	AG-60-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1
R2A	100Ω	2	A9.310-A	W-100	A43-100	VK-121	R100L	Hum balance-wire wound
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R3	68Ω	½		BTS-68	
R4	22KΩ	1		BTA-22K	
R5	1000Ω	½		BTS-1000	
R6	470KΩ	½		BTS-470K	
R7	39Ω	½		BTS-39	Note 2
R8	470Ω	½		BTS-470	
R9	22KΩ	½		BTS-22K	
R10	1000Ω	½		BTS-1000	
R11	4700Ω	½		BTS-4700	
R12	1000Ω	½		BTS-1000	
R13	470KΩ	½		BTS-470K	
R14	22KΩ	½		BTS-22K	
R15	15KΩ	2		BTB-15K	
R16	2.2Meg	½		BTS-2.2Meg	
R17	68Ω	½		BTS-68	
R18	22KΩ	1		BTA-22K	
R19	4700Ω	½		BTA-4700	
R20	47KΩ	½	♦	BTS-47K	
R21	470KΩ	½		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R22	220KΩ	½		BTS-220K	
R23	68Ω	½		BTS-68	
R24	47KΩ	1		BTA-47K	
R25	27KΩ	½		BTS-27K	
R26	1000Ω	½		BTS-1000	
R27	68Ω	½		BTS-68	
R28	68KΩ	½		BTS-68K	
R29	1000Ω	½		BTS-1000	
R30	6800Ω	½		BTS-6800	
R31	6800Ω	½		BTS-6800	
R32	1500Ω	½		BTS-1500	
R33	220KΩ	½		BTS-220K	
R34	2.2Meg	½		BTS-2.2Meg	
R35	10Meg	½		BTS-10Meg	
R36	220KΩ	½		BTS-220K	
R37	1000Ω	½		BTS-1000	
R38	180KΩ	½		BTS-180K	Note 1
R39	22KΩ	½		BTS-22K	
R40	2200Ω	15	14.294		

♦ Items R20, C31A, C31B are combined in one unit.
Note 1. Some Models may use a 150KΩ resistor in this application.
Note 2. Some Models may use a 43Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	KNIGHT PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordorson PART No.
T1	117VAC @ .53A	600VCT .079ADC	5VAC 2A	6.3VAC @ .59A	B18.127 B18.125 ①					T-25R15
				SEC. 4						
				6.3VAC @ 2.4A						

① Alternate power transformer.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	KNIGHT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	0Ω	0Ω	A2.241				
L2	Fil. Choke	.3Ω		2.702	19-1001	TV-189	4604	1.5 Microhenries; IRC Part # CLA
L3	FM RF Choke	1Ω		B2.402	19-1002		4606	3 Microhenries
L4	FM RF Coil	0Ω		A2.736				
L5	Fil. Choke	.3Ω		2.702	19-1001	TV-189	4604	1.5 Microhenries; IRC Part # CLA
L6	FM Osc. Coil	0Ω	0Ω	B2.735				
L7	Parasitic Suppressor	0Ω		A2.279				Wound on 1KΩ resistor

PARTS LIST AND DESCRIPTIONS (Continued)

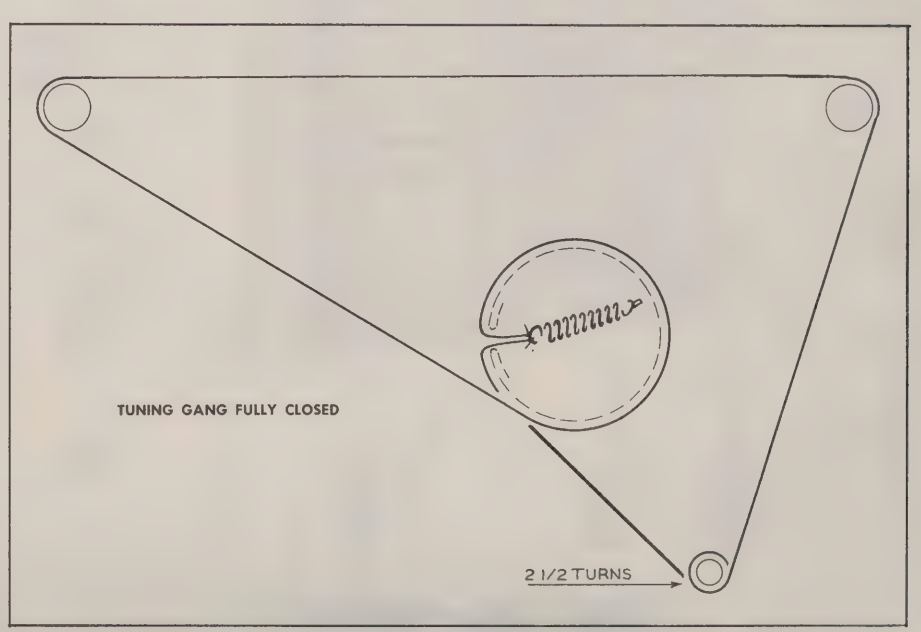
COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	KNIGHT PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L8	AM Ant. Coil	1.2Ω		2.699			6300	
L9	AM Osc. Coil	6.5Ω		A2.698			71-Osc. *	Tapped @ .8Ω
L10	1st FM IF	.6Ω	.6Ω	2.415	16-3487	FM-254	1463	
L11	1st AM IF	9.5Ω	9.5Ω	2.275	16-6758	BC-352	12-C1	
L12	2nd FM IF	.6Ω	.6Ω	2.415	16-3487	FM-254	1463	
L13	2nd AM IF	9.5Ω	9.5Ω	2.275	16-6758	BC-353	12-C2	
L14	Fil. Choke	.3Ω		2.702	19-1001	TV-189	4604	1.5 Microhenries; IRC Part # CLA
L15	Ratio Det.	1.4Ω	.9ΩCT	2.474	17-3488 ♦	FM-255	1465	Tertiary winding=.4Ω
L16	Fil. Choke	.3Ω		2.702	19-1001	TV-189	4604	1.5 Microhenries; IRC Part # CLA

* Drill mounting hole.
♦ Cut out chassis hole and drill mounting holes.

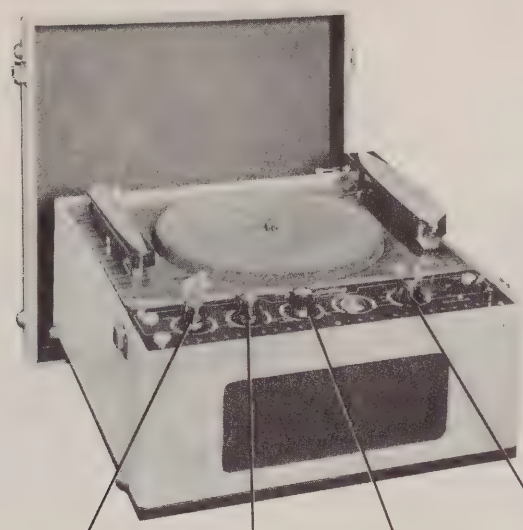
MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M1	Dial light		# 47 bayonet (2 used)
M2	Tuning cap	L6.116	4 section-AM (24-477MMF, 21-140MMF)
M3	Switch	B12.298	Function



DIAL CORD STRINGING

MASCO
MODELS RK6, RK6R



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO

MASCO
MODELS RK6, RK6R

TRADE NAME	Masco Models RK6, RK6R
MANUFACTURER	Mark Simpson Mfg. Co., Inc., 32-28 49th St., Long Island City 3, N.Y.
TYPE SET	AC Operated Disc Recorder (Model RK6R has AM tuner)
TUBES	Model RK6 - Five Model RK6R - Seven
POWER SUPPLY	110-120 Volts AC-60 Cylces RATING .4 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1700KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Set the selector switch to either "Record" or "PA" position.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Attenuate generator output to maintain not more than 1.5 volts on output meter.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to antenna stator lug on tuning gang. Low side to chassis.	455KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Short the oscillator section of tuning gang. Adjust for maximum output.
2.	Direct	High side to external antenna lug on antenna coil (L1). Low side to chassis.	1700KC	"	"	A5	Adjust for maximum output.
3.	"	"	1500KC	Tune for max. signal	"	A6	"
4.	"	"	600KC	"	"	A7	Adjust for maximum output. Repeat steps 2, 3 and 4 until proper tracking is obtained.

5. Tube replacement may necessitate readjustment of hum control (R4A) and eye level control (R3A) .
To adjust hum control proceed as follows:
(a) Switch on the amplifier (do not plug in microphone or radio. Do not play record).
(b) Set volume control for maximum volume. Set tone control to "treble".
(c) Adjust R4A for MINIMUM hum.

6. The eye level control is factory sealed and should be adjusted if after tube replacement a properly made record is badly distorted due to too high or too low recording level. Break seal and adjust as follows:
(a) Turn amplifier switch on and set selector switch to "PA".
(b) Feed 400∿ or 1000∿ signal into "phono jack".
(c) With recording head plugged in, adjust volume control for 120 volts AC at point Ⓐ .
(d) Adjust R3A until signal applied in step (b) just closes "eye". Reseal R3A.

FOR SERVICE INFORMATION ON MECHANICAL RECORDER UNIT - SEE SIMILAR UNIT IN PHOTOFACT SET #35-FOLDER #28.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MASCO PART No.	STANDARD REPLACEMENT		
V1	Converter	6SA7GT	6SA7GT	8AD	Used in Model RK6R only
V2	IF Amp Det AVC	6SF7	6SF7	7AZ	
V3	Mic Pre Amplifier-AF Amplifier	6SL7GT	6SL7GT	8BD	
V4	AF Amp. - Vol Level Rectifier	6SL7GT	6SL7GT	8BD	
V5	Audio Output	6V6GT	6V6GT	7S	
V6	Vol. Level Ind.	6U5GT	6U5GT	6R	
V7	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

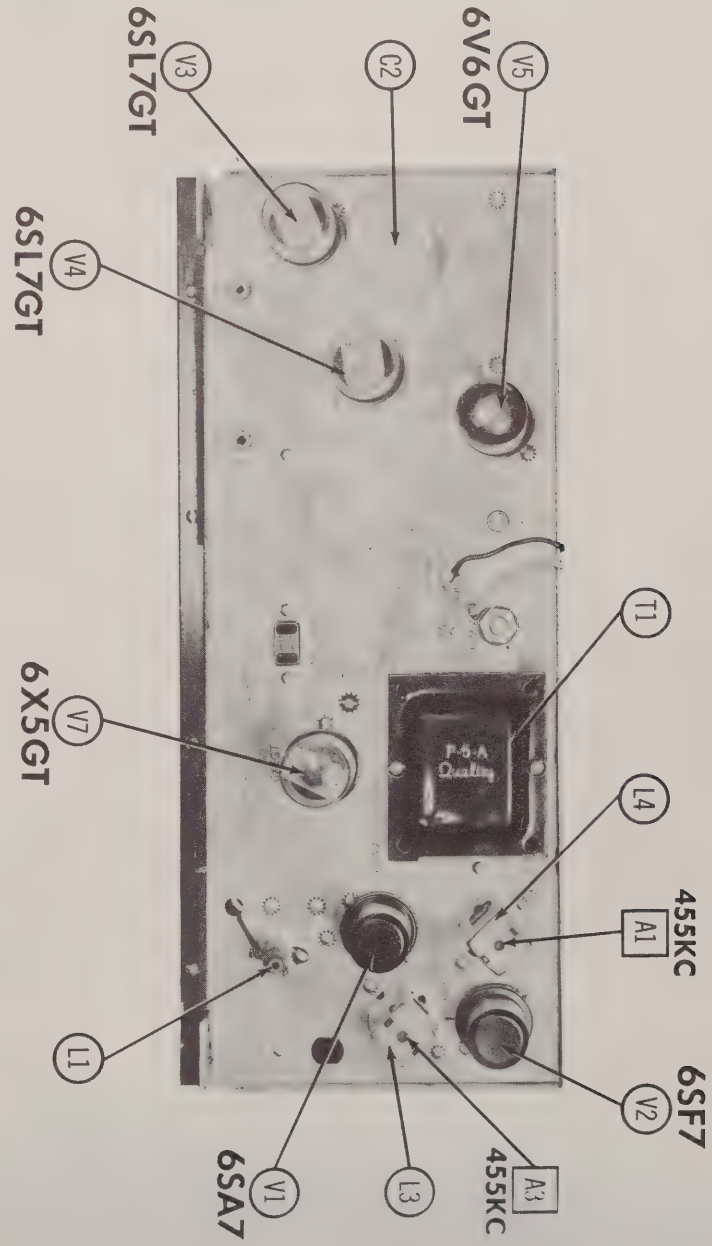
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MASCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1	16	450		PRS450/16		BR1615		TC74	TVA-1708	
C2A	▲20	450		AFH4-14		D013		FP444	TVL-4763	
B	■20	450								
C	▲10	450								
D	10	450								
C3	8	450		PRS450/8		BR815		TC71	TVA-1704	
C4	10	50		PRS50/10		BR105		TC32	TVA-1304	
C5	.1	600		P688-1	DF-104	CUB6P1		PT601	6TM-P1	Note 1
C6	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C7	100	500		1469-0001		5W5T1		MC235		
C8	100	500		1469-0001		5W5T1		MC235		
C9	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C10	.005	600		P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	Note 2
C11	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C12	100	500		1469-0001		5W5T1		MC235		
C13	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C14	.005	600		P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	Note 2
C15	.005	600		P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C16	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C17	.005	600		P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C18	.1	600		P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C19	.1	600		689ZX-1	DF-104	PJ6P1		PT601	6TM-P 1	
C20	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	Note 3

Note 1. Some models use an .05MFD @ 600V in this application.
Note 2. Some models use an .01MFD @ 600V in this application.
Note 3. Not used in all models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MASCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½		Q13-133	A-47-500K-Z	B-60	U-48	Volume
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	Attach to R1A
R2A	500KΩ	½		Q13-133	A-47-500K-Z	B-60-S	U-48	Tone
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	Attach to R2A
C	Switch			76-1	SWE-12	Not Req.	US-26	Attach to R2A
R3A	500KΩ	½		Q13-133	A47-500K-Z	B-60	U-48	Eye level
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	Attach to R3A
R4A	50Ω	2		W-50	A43-50			Hum wire wound
B	Shaft			Not Req.	RS-2			Attach to R4A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MASCO PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R5	27KΩ	1/2		BTS-27K	
R6	4700Ω	1/2		BTS-4700	
R7	1 Meg	1/2		BTS-1 Meg	Note 1
R8	100KΩ	1/2		BTS-100K	Note 1
R9	2. 7Meg	1/2		BTS-2. 7Meg	
R10	47KΩ	1/2		BTS-47K	
R11	470KΩ	1/2		BTS-470K	
R12	4700Ω	1		BTA-4700	
R13	2. 7Meg	1/2		BTS-2. 7Meg	
R14	270KΩ	1/2		BTS-270K	Note 2
R15	47KΩ	1/2		BTS-47K	
R16	1. 5Meg	1/2		BTS-1. 5Meg	
R17	470KΩ	1/2		BTS-470K	
R18	1. 5Meg	1/2		BTS-1. 5Meg	
R19	2200Ω	1/2		BTS-2200	
R20	47KΩ	1/2		BTS-47K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA MASCO PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R21	4700Ω	1/2		BTS-4700	
R22	47KΩ	1/2		BTS-47K	
R23	5. 6Meg	1/2		BTS-5. 6Meg	
R24	470KΩ	1/2		BTS-470K	
R25	270Ω	1		BTA-270	
R26	27KΩ	1/2		BTS-27K	
R27	1 Meg	1/2		BTS-1 Meg	
R28	1. 5Meg	1/2		BTS-1. 5Meg	
R29	4700Ω	1/2		BTS-4700	
R30	47KΩ	1/2		BTS-47K	
R31	470KΩ	1/2		BTS-470K	
R32	82Ω	1			Note 3
R33	4Ω	2			
R34	270Ω	2			
R35	10KΩ	1/2		BTS-10K	

Note 1. Not used in all models
Note 2. Some models may use a 2. 7Meg resistor in this application.
Note 3. Some models may use a 32Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC . 40A	475VCT . 48ADC	6. 3VAC ⓐ 3. 1A		P-5-A	PM-8419①				26R31U ①

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	5KΩ	3 to 4Ω	T-5-A	A-3877 ①	A-2930 ①	S-5X	Z1109①②	TS-24S51①	① Drill one new mounting hole. ② Tape extra sec. taps

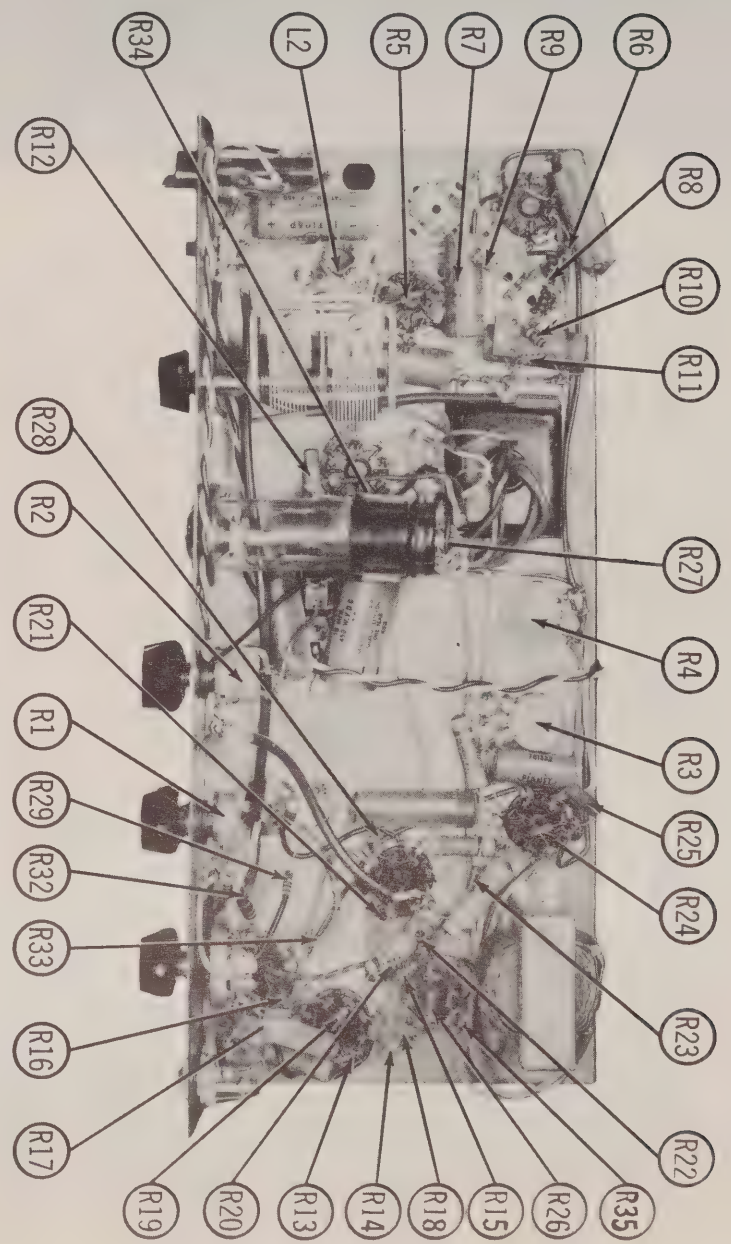
COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MASCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	1.1Ω					6300	
L2	Osc. Coil	6.5Ω		S-225				Tapped ⓐ, 6Ω
L3	Input IF	20Ω	20Ω	1655-1	16-6758	BC-357	12-C1	
L4	Output IF	16Ω	16Ω	1655-6	16-6758	BC-353	12-C2	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA MASCO PART No. FUSE	MASCO PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	2A			312002 (3AG-2A)	341001	AGC 2	HKP

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	MASCO PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2		*X-26	Optional			16	0-13 or S-13	*Cutter cartridge

ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

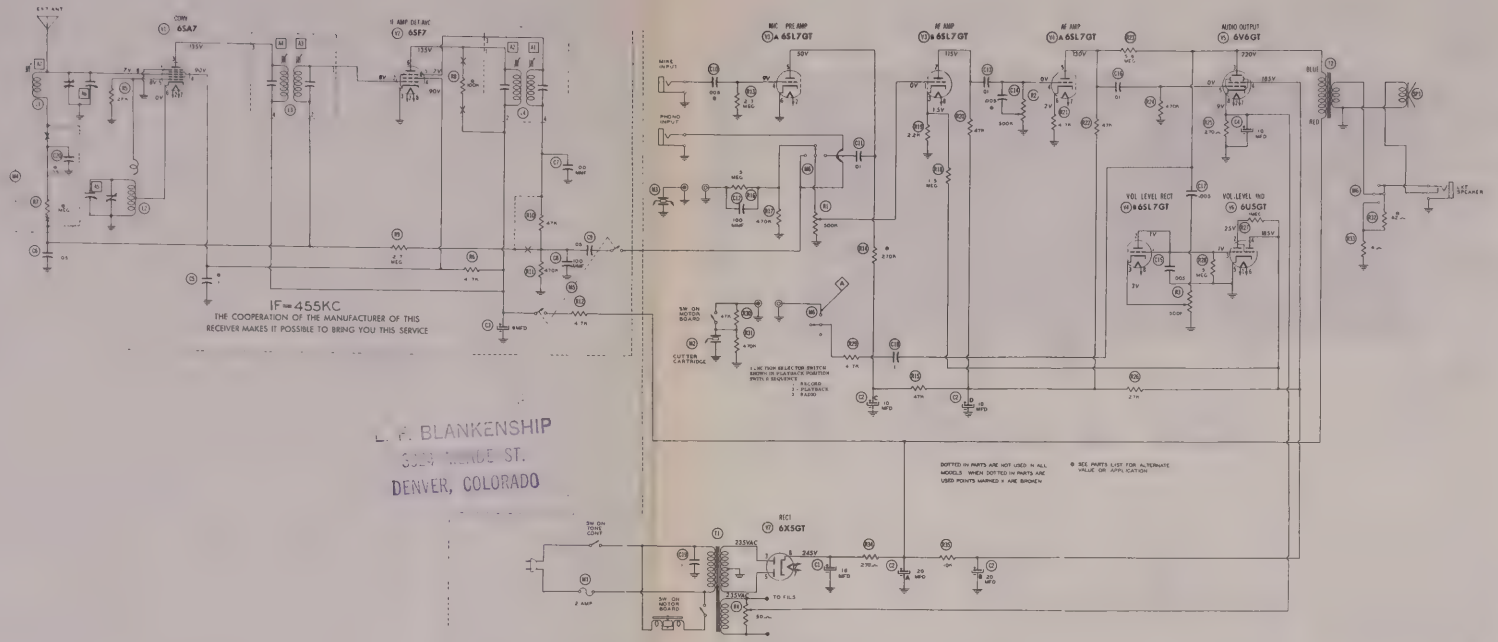
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	MASCO PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M3		*E-91 †E-93	†AC-367 *†AC-333 *AC-369 ♦†AC-333D3 ♦*AC-369D1 *♦AC-369D2 ♦AC-369D	*†W-22AS †W-22TPA *W-22TPS	* Metal † Jewel ♦ Diamond
		†J-10	†D-366	WC-25	Cutter Needle

MISCELLANEOUS

ITEM No.	PART NAME	MASCO PART No.	NOTES
M4	Tuning Capacitor		31-390MMF, 30-193MMF
M5	Switch		Tuner Off/on
M6	Switch		Function (Playback-record-PA)



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3584 RIDGE ST.
DENVER, COLORADO

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SA7	0Ω	280Ω	†5KΩ	†9.7KΩ	27KΩ	.2Ω	280Ω	4.2Meg
V 2	6SF7	0Ω	3.2Meg	0Ω	†9.7KΩ	520KΩ	†5KΩ	280Ω	280Ω
V 3	6SL7	500KΩ	†84KΩ	2.2KΩ	2.7Meg	†355KΩ	0Ω	280Ω	280Ω
V 4	6SL7	1.5Meg	1.5Meg	500KΩ	500KΩ	†84KΩ	4.7KΩ	280Ω	280Ω
V 5	6V6GT	0Ω	280Ω	†700Ω	†10.3KΩ	470KΩ	†700Ω	280Ω	270Ω
V 6	6U5	280Ω	†1Meg	1.5Meg	†10.3KΩ	1.5Meg	280Ω		
V 7	6X5GT	†270Ω	280Ω	230Ω	†5KΩ	230Ω	†10.2KΩ	280Ω	150KΩ

† MEASURED FROM PIN 8 OF V7

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RETMA MEMBER

RAYTHEON MODELS
C-2137A, C-2138A, M-2131A (Ch. 21T11)

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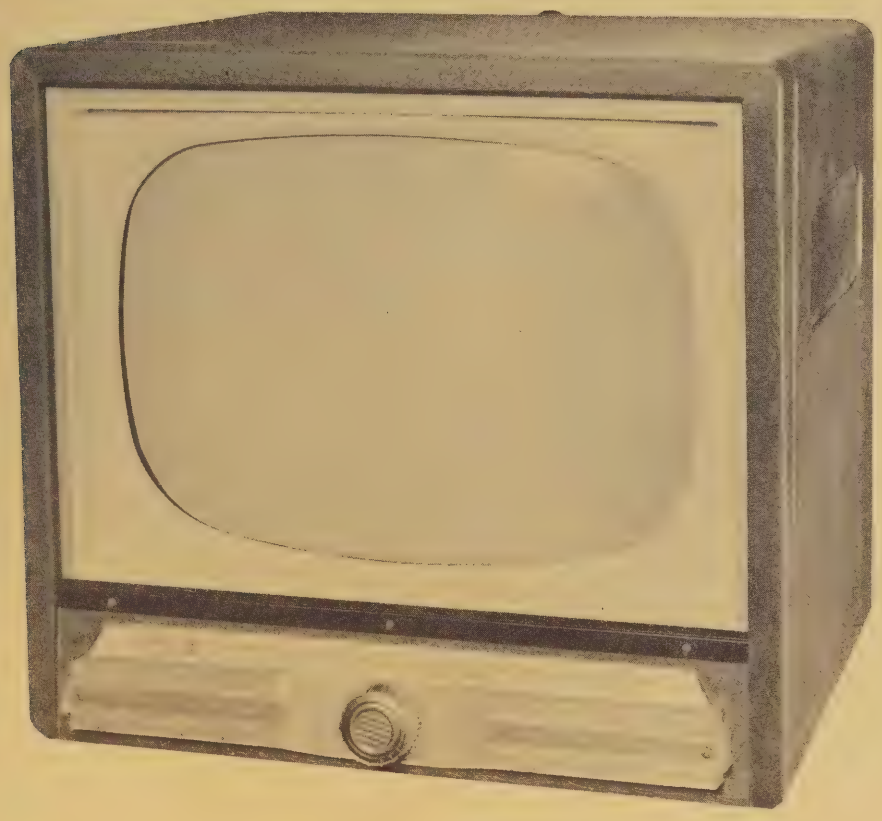

MODEL M-2131A

RAYTHEON MODELS
C-2137A, C-2138A, M-2131A (Ch. 21T11)

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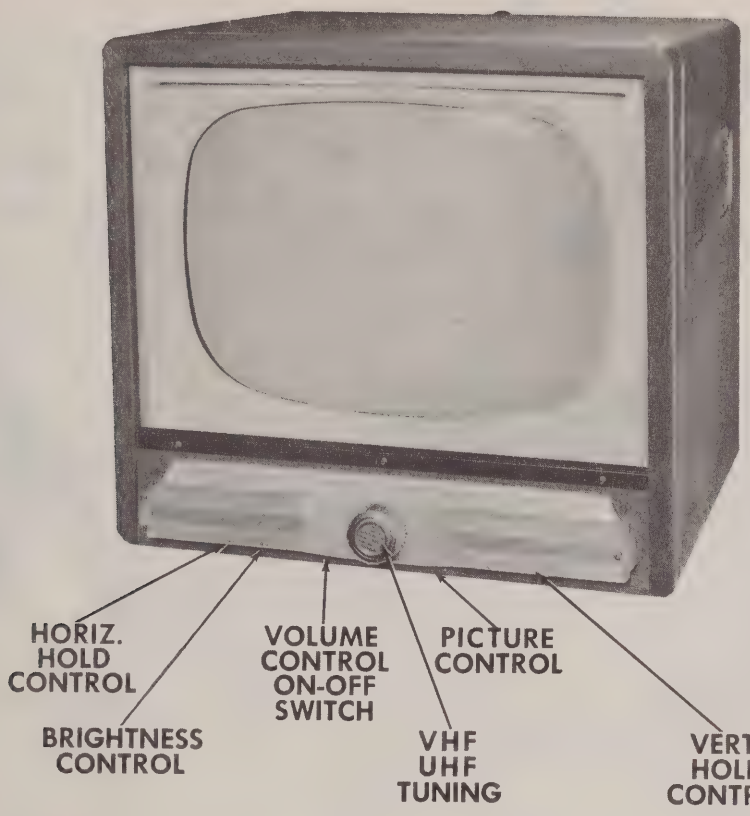
RAYTHEON MODELS C-2137A, C-2138A, M-2131A (Ch. 21T11)



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RAYTHEON MODEL M-2131A

TRADE NAME	Raytheon Models C-213A, C-2138A, M-2131A, (Ch. 21T11)
MANUFACTURER	Raytheon Manufacturing Co., Television & Radio Div., 5921 W. Dickens Ave., Chicago 39, Ill.
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	105-115 volts AC - 60 cycle RATING . 43 Amp. @ 115 volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 26. 75MC, Sound IF 22. 25MC (Intercarrier)

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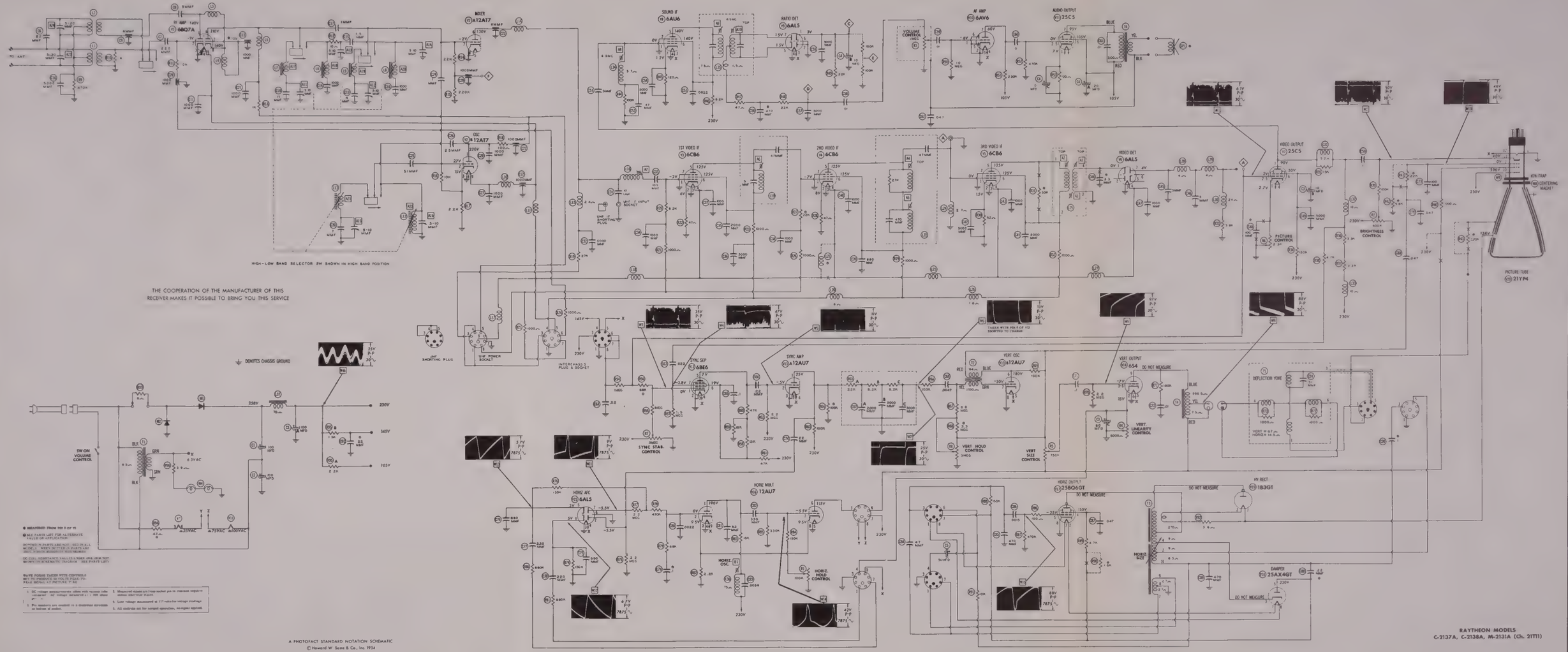

RAYTHEON MODELS
C-2137A, C-2138A, M-2131A (Ch. 21T11)

RAYTHEON MODELS
C-2137A, C-2138A, M-2131A (Ch. 21T11)

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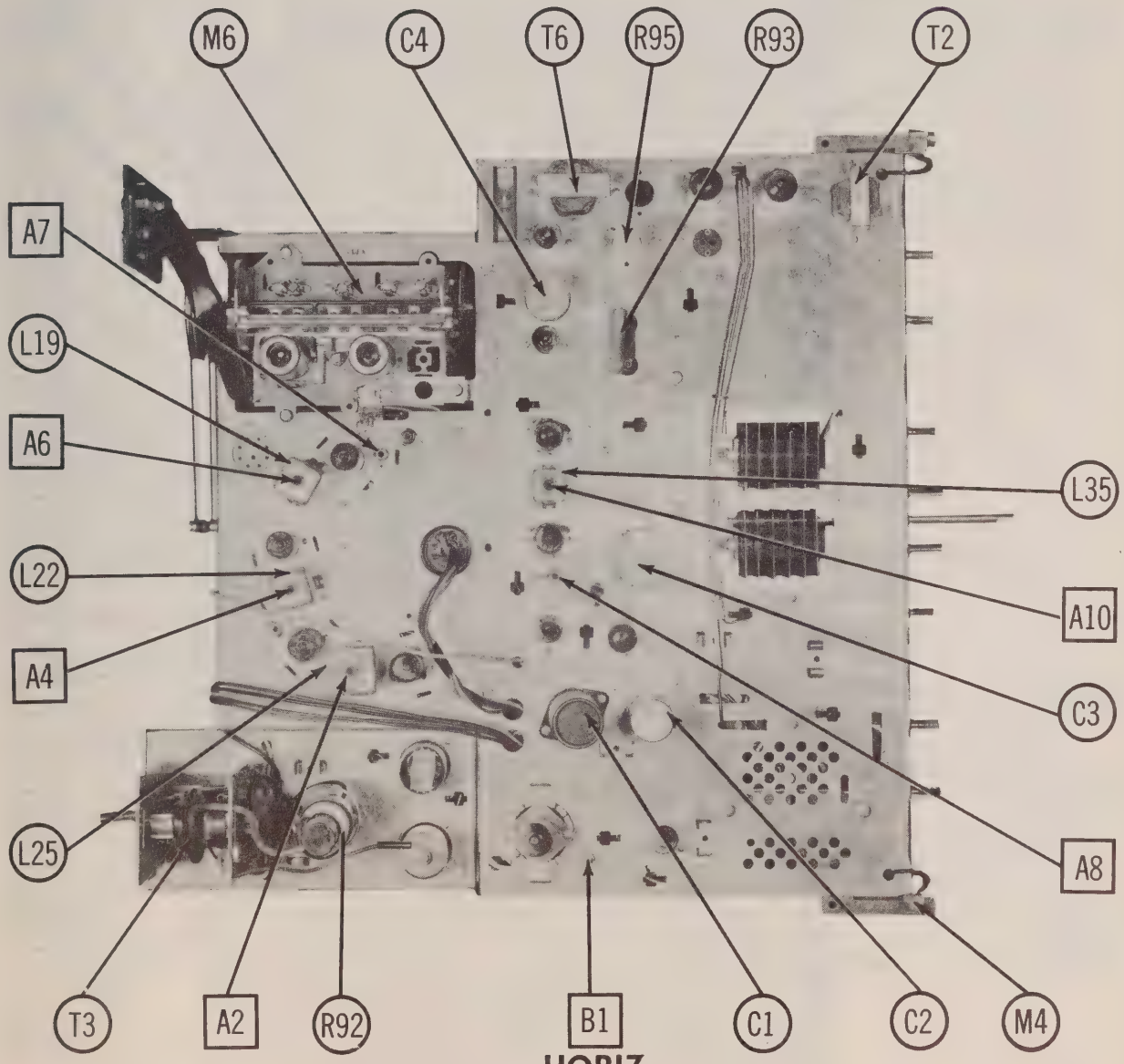
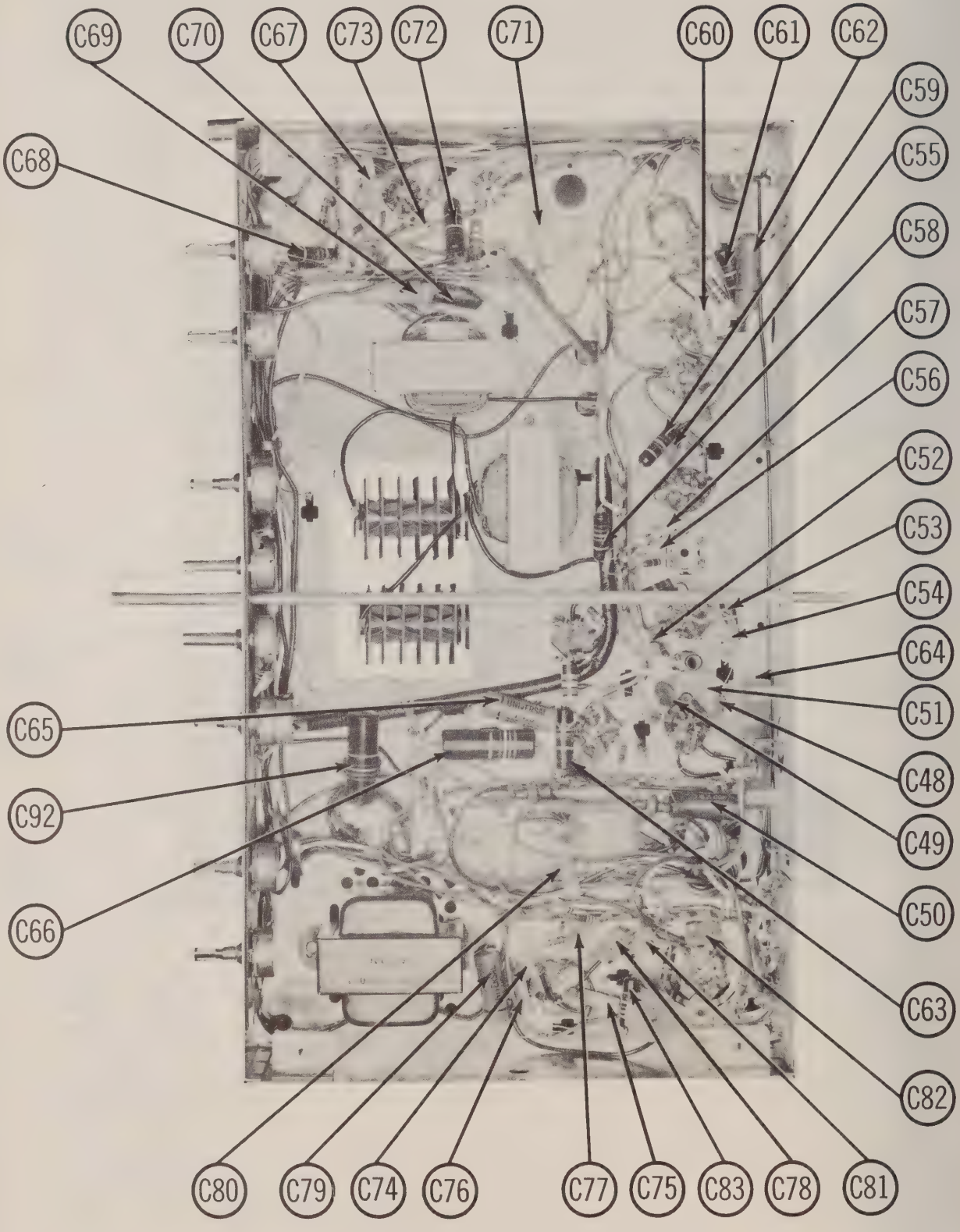


CHASSIS TOP VIEW



DEFLECTION CHASSIS - BOTTOM VIEW CAPACITOR IDENT.

ALIGNMENT INSTRUCTIONS

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DENVER, COLORADO

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V16) to disable the high voltage.
Allow at least a 5 minute warm-up period for receiver and test equipment.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Use very short leads from generator to prevent regeneration.
Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point (A). Low side to chassis.	25MC (10MC Swp)	23.9MC 26.3MC	11	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A1, A2 A3	Connect short between pins 5 (plate) and pin 6 (screen) of 6CB6 (V4). Adjust for response curve similar to Fig. 1. A3 is a coupling rod adjustment (bottom) and affects band width. Remove short from pins 5 and 6 of V4.
2.	"	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	Not used	21.2MC (Unmod)	"	Use VTVM. DC probe to point (B). Common to chassis.	A4	Adjust for maximum deflection. Attenuate signal generator to maintain not more than 2 volts at VTVM.
3.	"	"	"	26.5MC	"	"	A5	Adjust for maximum deflection. Attenuate generator output to maintain not more than 2 volts at VTVM. Repeat step 2.
4.	"	"	"	24.0MC	"	"	A6	Adjust for maximum deflection. Attenuate signal generator to maintain not more than 2 volts at VTVM.
5.	"	"	"	25.0MC	"	"	A7	"
6.	"	"	25MC (10MC Swp)	23.8MC 26.65MC	"	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.		Check for response curve similar to Fig. 2. Rock A2 for flat topped response. If after retouching A2 response is not similar to Fig. 2. Repeat steps 1 thru 6.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (E) as shown on the schematic.
Short antenna terminals to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (C). Common to chassis.	A8, A9	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (D). Common to point (E).	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.
Short antenna terminals to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (C). Low side to chassis.	A8, A9	Disconnect stabilizing capacitor C4B. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
8.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A10	Reconnect stabilizing capacitor C4B. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

TUNER ALIGNMENT

Preset trimmer screws (All thru A16) as shown in Fig. 7.
Set the tuner to the top of its stroke (cores furthest out of coil form) in low band position. Preset A17 thru A22 so that the cores are 1.6" from end of coil form.

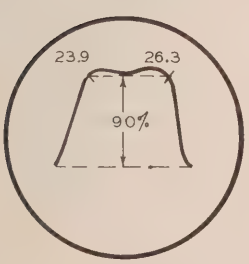

FIG. 1

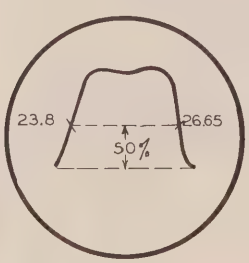

FIG. 2

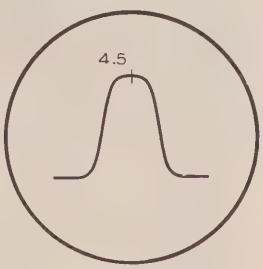

FIG. 3

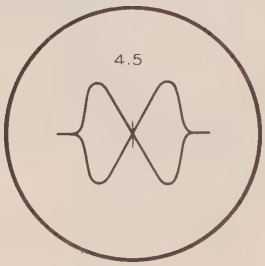

FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

LOW BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. thru 10KΩ to point (F). Low side to chassis.	A23, A13, A14	Adjust for maximum response. Response curve should be similar to Fig. 5.
10.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		If markers fall below 70% on any low band channel make compromise adjustment of A23, A13 and A14 with channel selector set to that channel, then check all other low band channels to see that they have not been seriously affected.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

HIGH BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω carbon resistors	Across VHF antenna terminals with 120Ω in each lead	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp thru 10KΩ to point (F). Low side to chassis.	A24, A11, A12	Adjust for maximum response. Curve should be similar to Fig. 5.
12.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		If markers fall below 70% on any high band channel make compromise adjustments of A24, A11 and A12 with channel selector set to that channel then check all other high band channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			

LOW BAND OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	85MC (10MC Swp)	83.25MC	6	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A16	Adjust to place video marker at 50% on response curve as in Fig. 6.
14.	"	"	69MC (10MC Swp)	67.25MC	4	"		Check for response similar to Fig. 6.
			57MC (10MC Swp)	55.25MC	2			

HIGH BAND OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC	13	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A15	Adjust to place video marker at 50% on response curve as in Fig. 6.
16.	"	"	195MC (10MC Swp)	193.25MC	10	"		Check for response similar to Fig. 6.
			177MC (10MC Swp)	175.25MC	7			

UHF TUNER

The UHF tuner portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

FIG.5

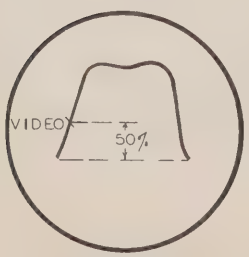

FIG.6

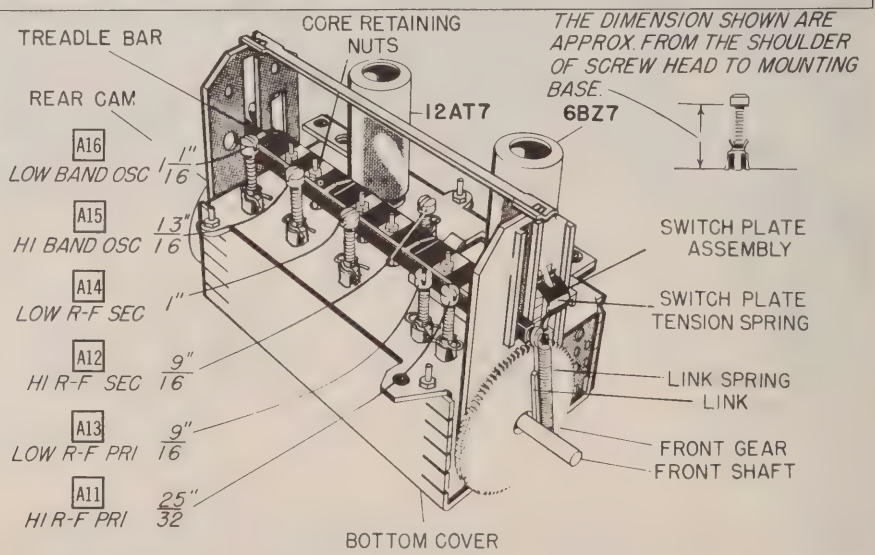

FIG.7

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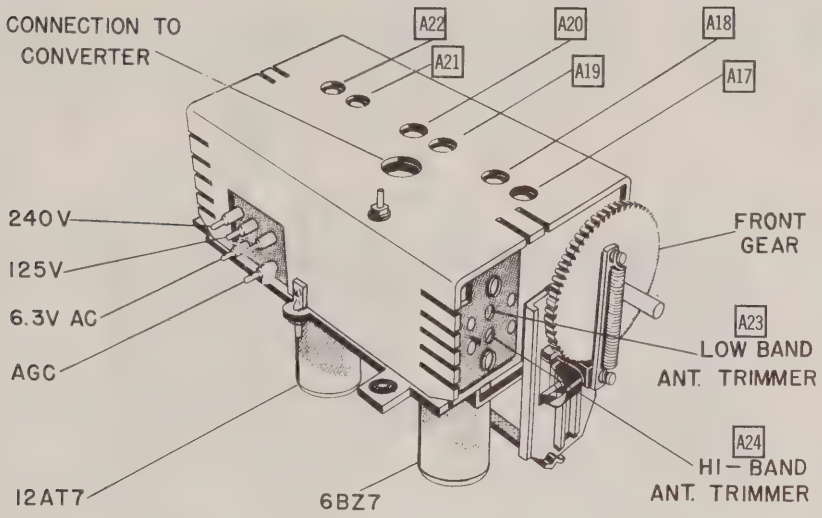
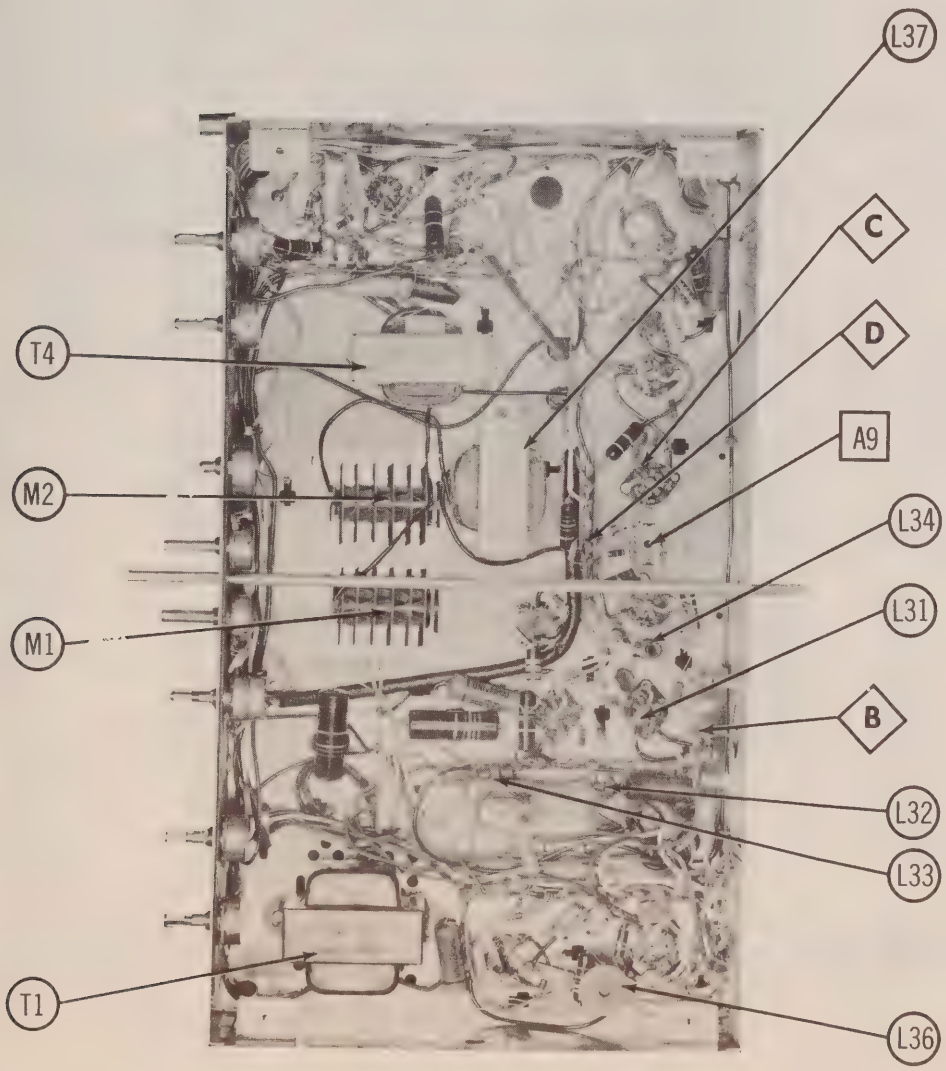
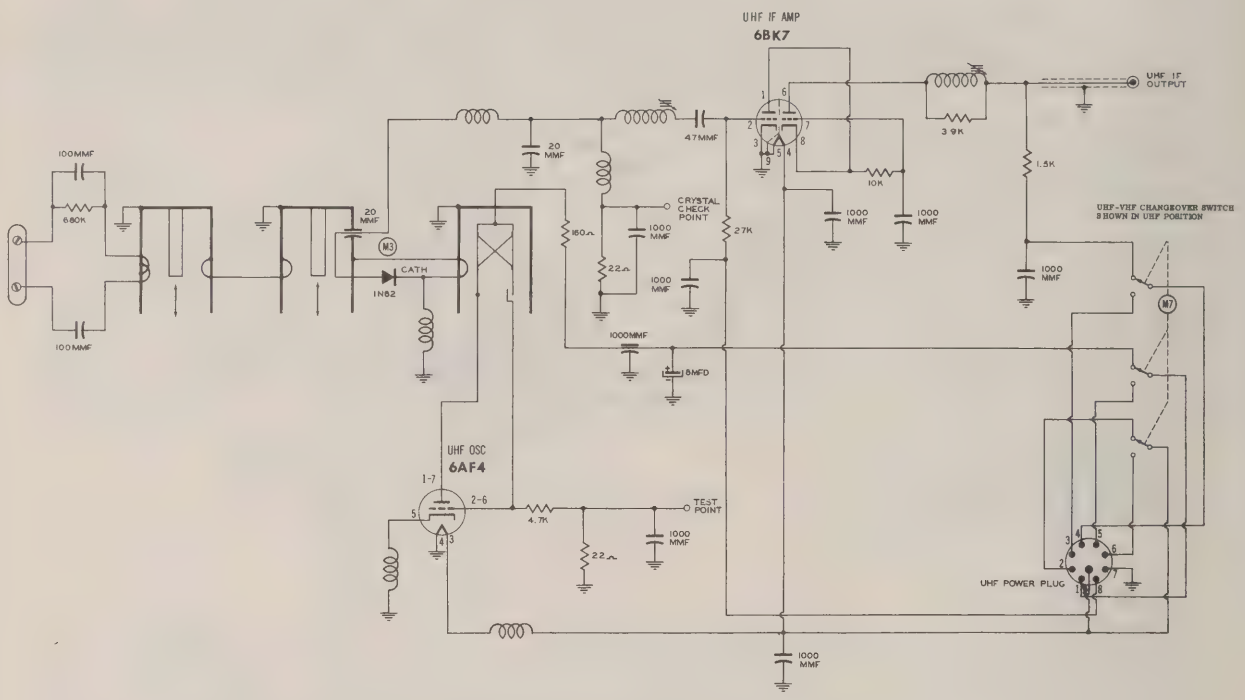




DEFLECTION CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN.



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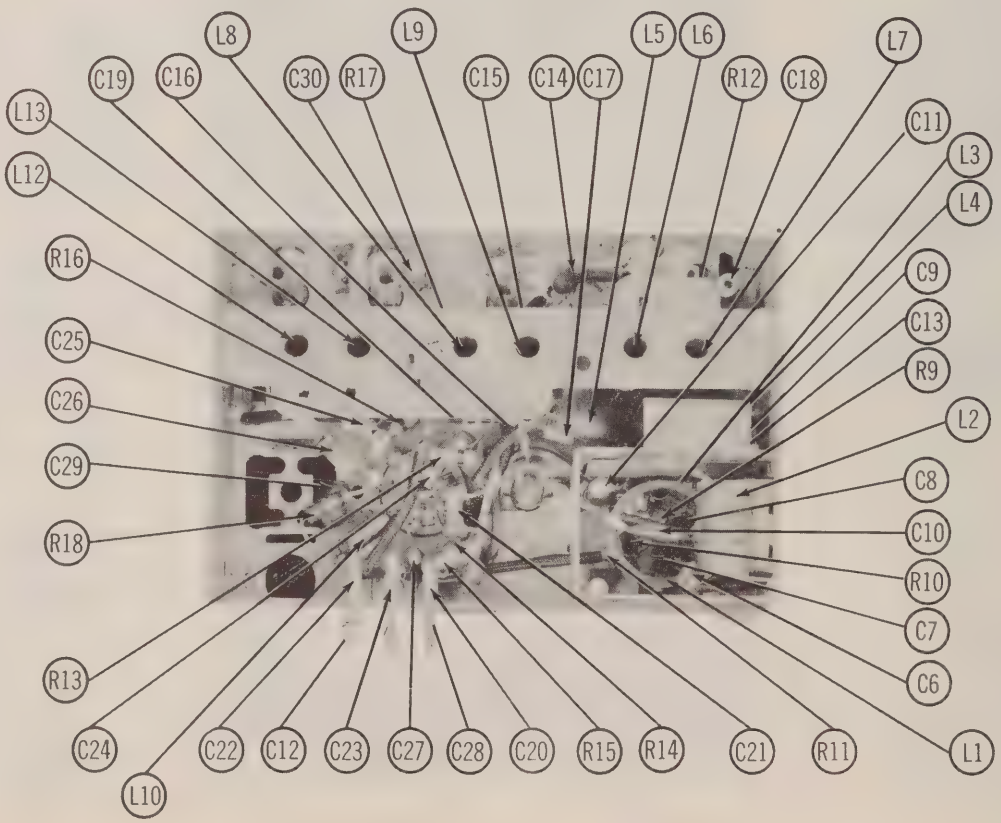
UHF CONVERTER USED IN SOME MODELS

UHF- TUNER SCHEMATIC



VHF TUNER-BOTTOM VIEW

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3924 [illegible] ST.
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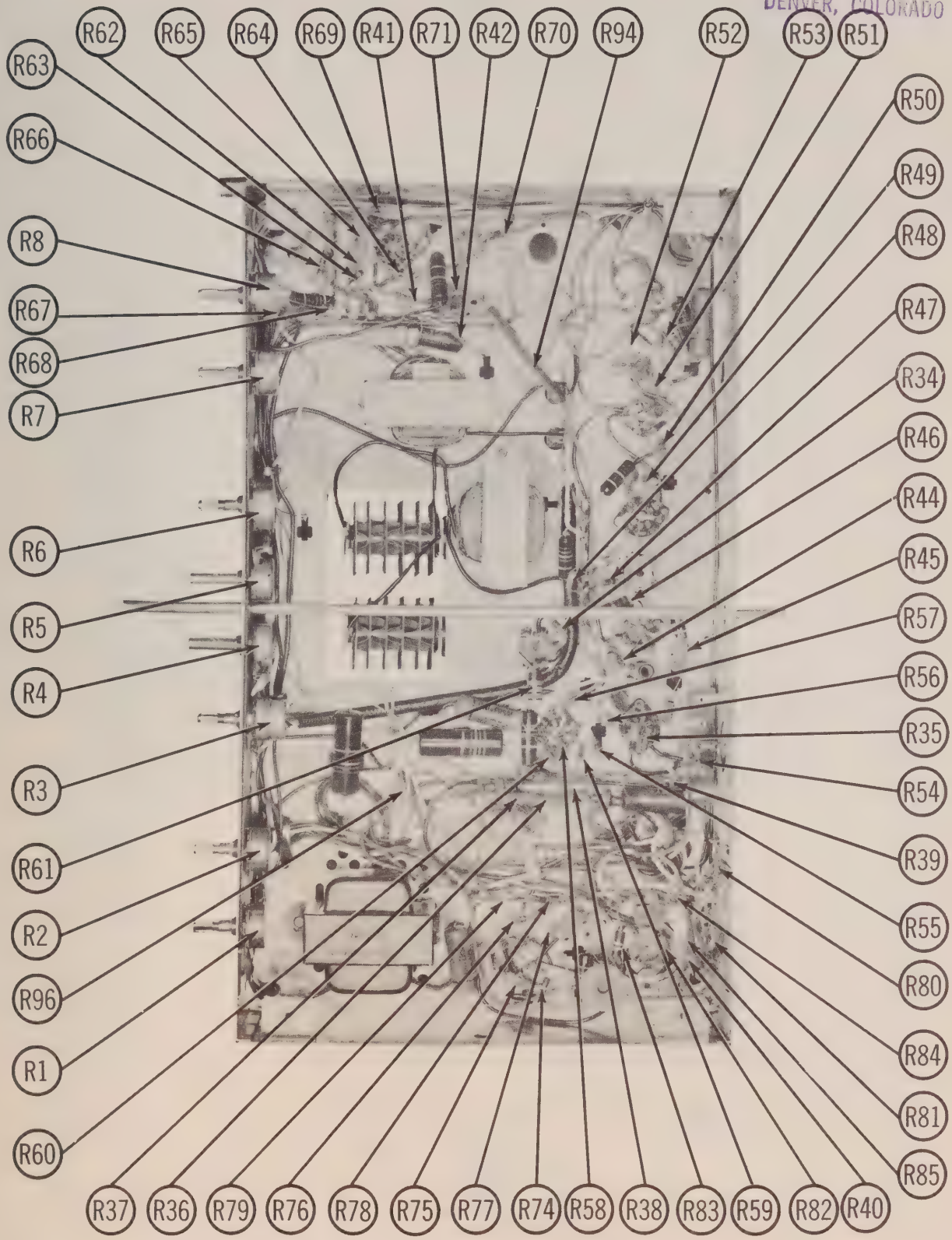
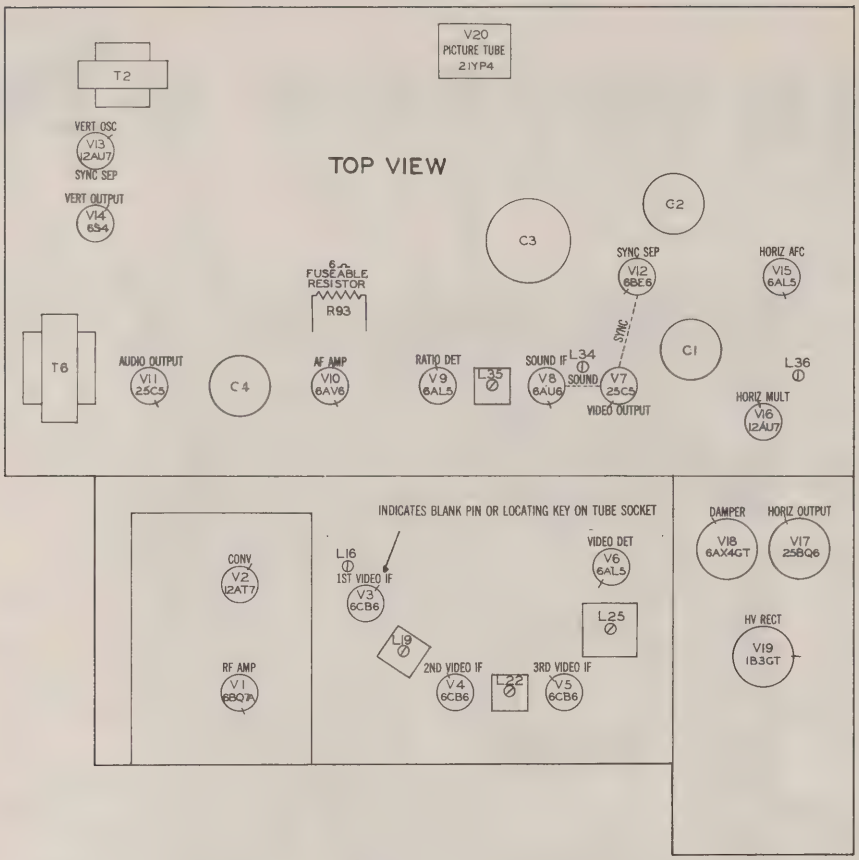


DEFLECTION CHASSIS BOTTOM VIEW–RESISTOR IDENT.

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

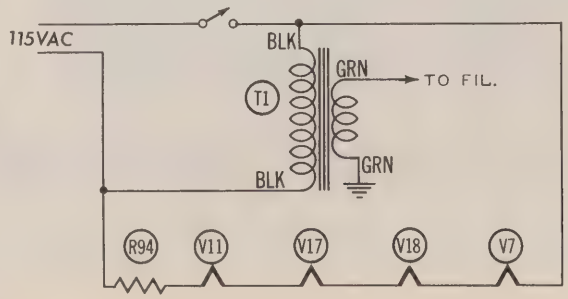
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V7**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V20**
Has pic, no sound - **V8, V9, V10, V11**

SYNC FAILURE
No vert. sync - **V13**
No horiz. sync - **V13, V15, V16**
No vert. or horiz. sync - **V12, V13**

SWEEP FAILURE
No raster, has sound - **V16, V17, V18, V19, V20**
No vertical deflection - **V13, V14**
Poor vert. linearity or foldover -. **V13, V14**
Poor horiz. linearity or foldover - **V15, V16, V17, V18**
Narrow picture - **V15, V16, V17, V18, M1, M2**
Vert. off freq. - **V13**
Horiz. off freq. - **V13, V15, V16**

NOTE: Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative . (See Circuit below).



RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	1Meg	0Ω	0Ω	.1Ω	†1.1KΩ	INF	INF	0Ω
V 2	12AT7	†170Ω	12.2KΩ	2.2KΩ	0Ω	0Ω	†27KΩ	240KΩ	0Ω	.1Ω
V 3	6CB6	1Meg	47Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 4	6CB6	1Meg	47Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 5	6CB6	2.5Ω	82Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 6	6AL5	.3Ω	INF	0Ω	.1Ω	INF	INF	3.9KΩ		
V 7	25C5	140Ω	3.9KΩ	▲0Ω	▲12Ω	3.9KΩ	†150KΩ	†6.7KΩ		
V 8	6AU6	100KΩ	0Ω	.1Ω	0Ω	†8.3KΩ	†8.3KΩ	120Ω		
V 9	6AL5	22KΩ	0Ω	.1Ω	0Ω	INF	0Ω	INF		
V 10	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†220KΩ		
V 11	25C5	120Ω	470KΩ	▲28Ω	▲25Ω	470KΩ	†2.3KΩ	†2.5KΩ		
V 12	6BE6	72KΩ	0Ω	0Ω	.1Ω	65KΩ	30KΩ	1.5Meg		
V 13	12AU7	†55KΩ	2.3Meg	0Ω	.1Ω	.1Ω	▲760KΩ	7.8Meg	0Ω	0Ω
V 14	6S4	INF	1.8KΩ	2.2Meg	0Ω	.1Ω	2.2Meg	INF	INF	▲11KΩ
V 15	6AL5	150KΩ	2.2Meg	0Ω	.1Ω	4.5Meg	0Ω	2.2Meg		
V 16	12AU7	†10.2KΩ	4.9Meg	2.2KΩ	0Ω	0Ω	†150KΩ	150KΩ	2.2KΩ	.1Ω
V 17	25BQ6	INF	▲20Ω	2.5Ω	†4.8KΩ	470KΩ	470KΩ	▲25Ω	0Ω	TOP CAP ▲9Ω
V 18	25AX4	INF	INF	1Meg	INF	†70Ω	INF	▲20Ω	▲12Ω	
V 19	1B3GT	PINS 1 - 8 HAVE INF RESISTANCE								TOP CAP ▲280Ω
V 20	21YP4	0Ω	27.5KΩ	PIN 6 †70Ω	PIN 10 ▲11KΩ	PIN 11 †180KΩ	PIN 12 .1Ω			

▲ MEASURED FROM PIN 3 OF V7
† MEASURED FROM OUTPUT OF M1
▲ MEASURED FROM PIN 3 OF V18

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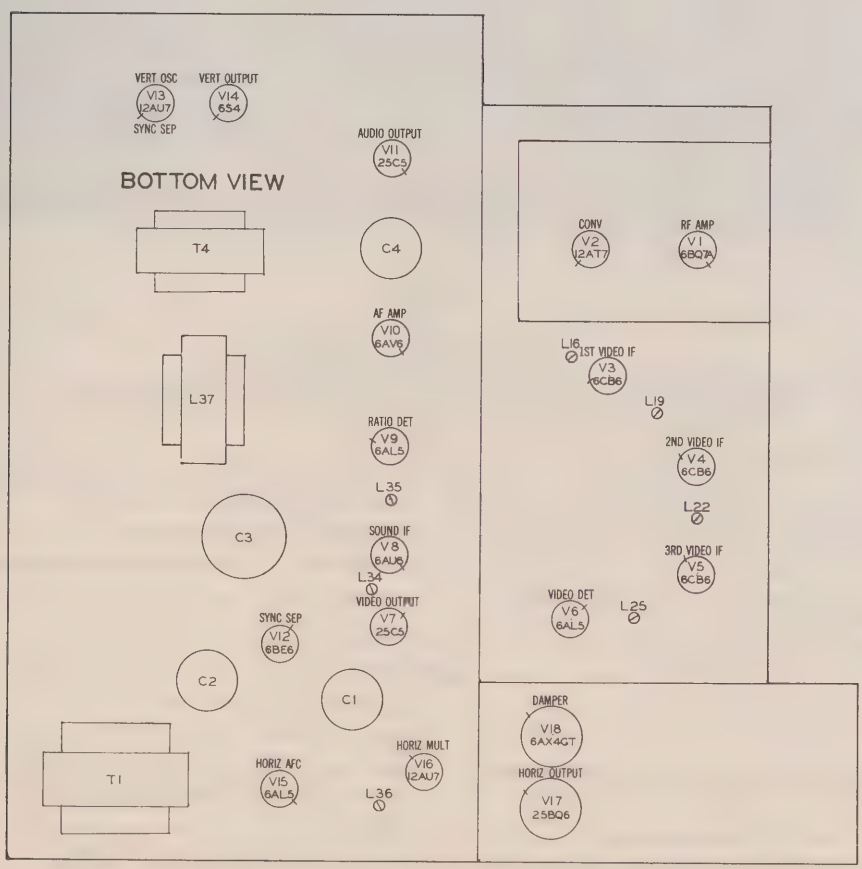

TUBE PLACEMENT CHART

SET 244 FOLDER 8

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17 and C18. Check horizontal size adjustment. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R89, C87, C90 and other associated components.	Check C84, C85, C86, R87, R88 and other associated circuit components.

DRIVE LINES

Check by substitution V16, V17, and V18. Check T3, T5A, C84, C85, C86, C88, C89, C91 and other associated components.

COMPRESSED LEFT SIDE

Check adjustment of the horizontal size control. Check by substitution V16, V17 and V18. Check components associated with the horizontal output and damper stages especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16, V17 and V18. Check C80 for open. Check T3, T5A and other associated components.

XMAS TREE EFFECT

Substitute V16. Check C81, C82, C83, L36 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R4 and other associated circuit components.	Check R5, T2, R70, C71 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check adjustment of height and vertical linearity controls. Check T4, T5B, C3C and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check T2, C71, R70 and other associated circuit components.

FOLDS

Check by substitution V13 and V14. Check components associated with these stages for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13. Check associated circuit components especially C63, C66, R57, R62, R63, and R64 for failure or change of value.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check T2, R66, C68 and other associated circuit components.	Check vertical integrator and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check components associated with V15 and V16.	Check C74 and other associated components.

HORIZONTAL BENDING

Check by substitution V15, V16 and V17. Check the horizontal AFC filter network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check associated components including picture tube.

SOUND BARS

Properly tune receiver to a station. Adjust volume control to minimum.

If Bars Dissappear	If Bars Remain
Check V1, V2, V3, V4, V5, V6, V7, V13 and V14 for microphonics.	Trouble is either outside interference or station trouble.

POOR CONTRAST

Check by substitution V6 and V7. Check contrast control, picture tube and other associated components.

NEGATIVE PICTURE

Check by substitution V7, V6, V5, V4, V3, V1 and V12. Check AGC network. Check picture tube and other associated circuit components.

SMEAR

Check by substitution V3, V4, V5, V6 and V7. Check R36, R37, R33, R34, R6, L28, L29, L30, L31, L32, L33, C3B, C49, C50, picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PICTURE

Check V1, V3, V4, V5 and V7 for heater to cathode to cathode leakage.

AUDIO

WEAK OR NO SOUND

Adjust tuning for best picture and sound. Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R50.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V10 and V11 especially C60 and T6.

BUZZ

Adjust tuning for best picture and sound. Ajust A10 for minimum buzz. If still unsatisfactory, substitute V9 and realign audio IF and detector stages.

DISTORTED

Proeeed as outlined under "Weak or No Sound".

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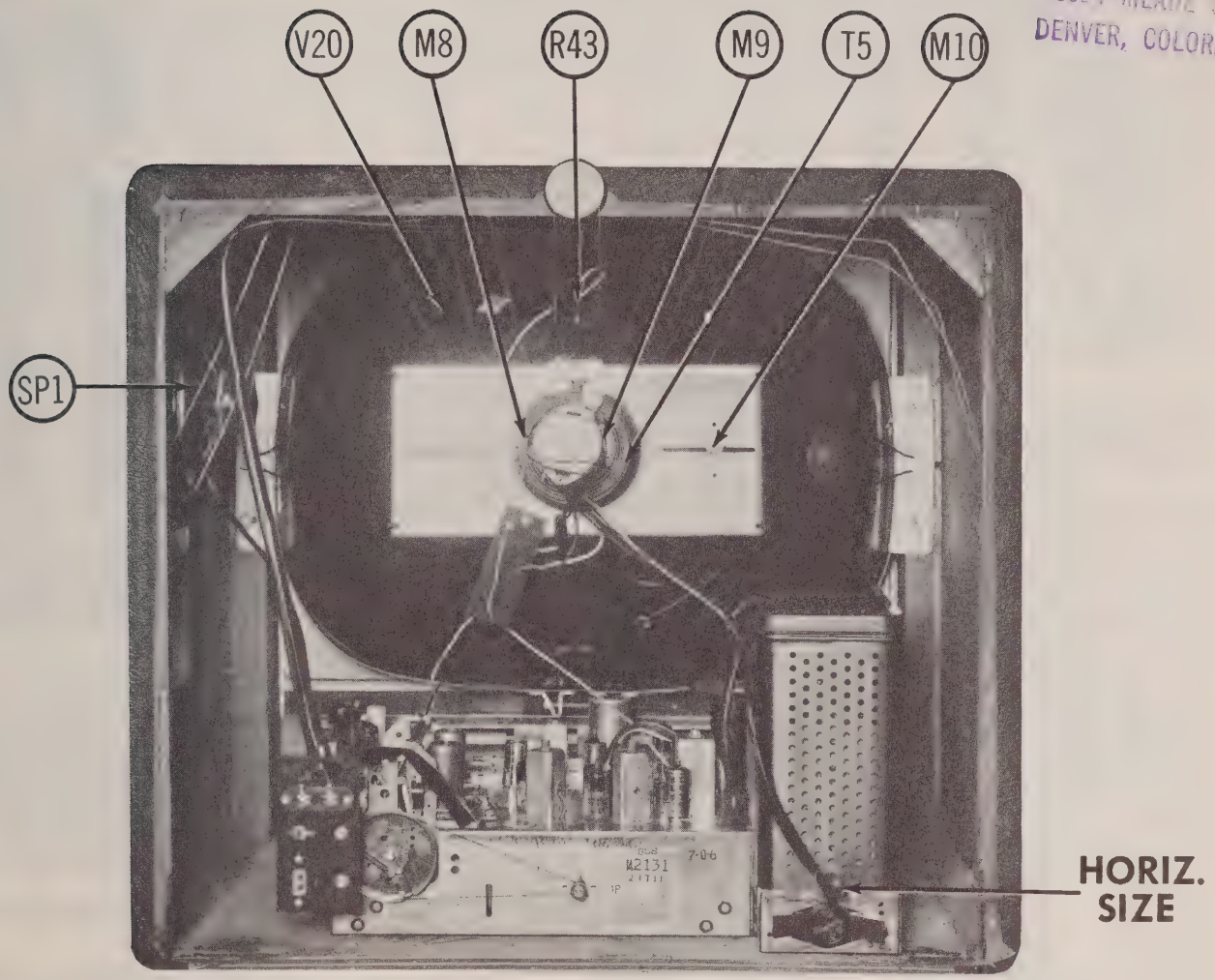

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to its mid-range position. Adjust the horizontal oscillator slug (B1) until the picture synchronizes. Continue turning B1 in same direction until picture loses sync then back off to a point approximately in the center of the effective range of B1. Momentarily interrupt the signal by switching off channel and back again. Picture should remain in sync. If necessary readjust B1 until this condition is obtained.

Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the sync stabilizer control for the most stable picture.

HORIZONTAL LINEARITY MAGNET ADJUSTMENT

Loosen the wing nut (to left of yoke) and slide the magnet until the picture is symmetrical from left to right. This magnet affects the linearity of the right side of the picture only.

ANTI-PIN CUSHION MAGNET ADJUSTMENT

The anti-pin cushion magnet is located just to the right of yoke. Adjust centering until the left edge of the raster becomes visible. Loosen the wing nut and slide the magnet until the edge of raster is vertical and straight.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA: RAYTHEON PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	
V2	Converter	12AT7	12AT7	9A	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Detector	6AL5	6AL5	6BT	
V7	Video Output	25C5	25C5	7CV	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector	6AL5	6AL5	6BT	
V10	AF Amplifier	6AV6	6AV6	7BT	
V11	Audio Output	25C5	25C5	7CV	
V12	Sync Separator	6BE6	6BE6	7CH	
V13	Vert. Oscillator-Sync Amplifier	12AU7	12AU7	9A	
V14	Vert. Output	6B4	6B4	9AC	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult	12AU7	12AU7	9A	
V17	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V18	Damper	25AX4GT	25AX4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA: RAYTHEON PART No	GBS-HYTRON PART No	GENERAL ELECTRIC PART No.	SYLVANIA PART No	WESTINGHOUSE PART No	RETMA BASE TYPE	NOTES
V20	21TP4	21TP4		21TP4	21TP4	12L	① Aluminized
		21TP4A①	21TP4A ①	21TP4A ①	21TP4A ①	12L	② Circuit changes
				21AFP4 ②		12M	necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	100	150	8C-22285	AFHS1-69		XA-003		FP116	TVL-1423	
C2	100	150	8C-22286	AFHS1-69		XA-003		FP116	TVL-1423	
C3A	▲100	300		AFH2-35		D002				
B	▲10	300	8C-22523	PR550/50		BR505		FP335	TVL-3574	
C	▲60	50								
C4A	▲20	300								
B	▲10	75	8C-22524	AFH3-106		C078		FP330.3 TC80	TVL-3634	
C	10	25						TC78		
C5	50	450	8C-22544	PR5450/50		BR5045			TVA-1713	
C6	22		8G-11892							
C7	220			SH30	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C8	1.5		8G-12495-8	SU.5NP0	TCZ-1.5	TZ04	NP0A-1R5	ZT-5515	5TCCB-V15	
C9	6		8G-20880							
C10	5000		8G-22612	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C11	1000		8G-13201	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C12	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C13	1000		8G-21747	EF-001	MFT-1000				503C-D1	
C14	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C15	1.5		8G-12495-2			TZ04				
C16	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C17	1		8G-12495-2			TZ03				
C18	15		8G-13017	SU.5NP0	TCZ-150	TZ11	NP0K-150		5TCCB-Q15	
C19	4		8G-19314	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C20	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C21	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C22	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C23	6		8G-20879							
C24	1		8G-12495-2			TZ03				
C25	51		8G-11891							
C26	2.5		8G-19566							
C27	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C28	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C29	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C30	7		8G-15324			Z014	NP0-031-050			
C31	10		8G-19502	SU0N750	TCM-10	TM01	NP0A-100	NT-541	5TCU-Q1	
C32	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C33	100	500	8F3-8	1469-0001		5W571		MCB235	MS-31	
C34	1000		8G-13201	SH1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1	
C35	2000		8G-19523	SI2000	D6-202	TP56	GP2L-202	UC-522	5GA-D2	
C36	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C37	1000		8G-13201	SH1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1	
C38	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C39	680		8G-21105	SI680	D6-681	TP50	GP1K-681	UC-5368	5GA-T68	
C40	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C41	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C42	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C43	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C44	3.3			SI3.3NP0	TCZ-3.3	TZ08	NP0K-3R3	ZT-5533	5TCCB-V33	Note 1
C45	5		8G-12166	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C46	5		8G-12166	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C47	1000		8G-13201	SH1000	D6-102	TP52	GP2K-102	UC-521	5GA-D1	
C48	100			SI100	D6-101	TP54	GP1K-101	UC-531	5GA-T1	Note 1
C49	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C50	.1	400	8J-18083	P488-1		CUB4P1		PT401	4TM-P1	
C51	5		8G-12166	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C52	47		8G-12196	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C53	.0022	400	8J-20834	P488-0022	D6-222	CUB4D23	GP2-333-222	PT4222	4TM-D22	
C54	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C55	5000		8G-13962	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C56	470	500	8F3-124	1469-0005		5W5747		MCB245	UFM-34	Note 2
C57	5000		8G-22132	SI5000	D6-502	TP54	GP2-333-502	UC-525	5GA-D5	
C58	.01	400	8J-20582	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C59	.01	400	8J-20582	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C60	.01	400	8J-20582	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C61	.01	600	8G-21206	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C62	.047	400	8J-18081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C63	.022	400	8J-19757	P488-022	DF-203	CUB4S22		PT4122	4TM-S22	
C64	.22	200	8J-16082	P488-22		PJ2P22		PT4022	2TM-P22	
C65	.1	200	8J-16085	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C66	.22	400	8J-16095	P488-22		CUB4P22		PT4122	4TM-P22	
C67A	2000									
B	5000		▲17A-22376	▲PA-110-1	▲PC-100	▲115TM-1	▲1405-01		▲101C1	
C	5000									
C68	.0047	400	8J-20580	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C69	.047	400	8J-18081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C70	.047	200	8J-16096	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C71	.1	400	8J-16083	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C72	.01	600	8J-16097	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C73	100			SI100NP0	TCZ-101	TZ30	NP0K-101	ZT-531	5TCC-T1	
C74	22		8G-11892	SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	
C75	680	500	8F3-123	1479-0007		1W5T68			MS-35	
C76	680	500	8F3-123	1479-0007		1W5T68			MS-35	
C77	220	500	8F3-117	1469-0002		5W5T22		MCB237	MS-32	
C78	220	500	8F3-117	1469-0002		5W5T22		MCB237	MS-32	
C79	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	Note 3
C80	.0022	200	8J-20578	P688-0022	D6-222	CUB6D23	GP2-333-222	PT6222	6TM-D22	
C81	82	500	8F3-112	1469-000075		5W5Q82				
C82	330	500	8F3-119	1479-00035		5W5T33		MCB241	MS-33	
C83	.0039	600	8J-20813	P688-0039	D6-392	CUB6D39	GP2-333-392	PT6239	6TM-D39	
C84	47		8G-19663	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C85	470	500	8F3-121	1469-0005		5W5747		MCB245	MS-35	
C86	.0015	400	8J-20589	P688-0015	D6-152	CUB6D15	GP2-333-152	PT6215	6TM-D15	
C87	.047	400	8J-18081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C88	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	Note 4
C89	470	1000	8G-21440							
C90	.1	200		P288-1	DF-104	PJ2P1		PT401	2TM-P1	Note 3
C91	51									
C92	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	Note 4

Note 1. Not used in all models.
Note 2. Some models may use an 820MMF ① 500V in this application.
Note 3. Some models may use a .22MFD ② 200V in this application.
Note 4. Some models may use a .47MFD ③ 400V in this application.
♦ Items C67A, C67B, C67C, R65A, R65B and R65C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RAYTHEON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ	½	B10B-17275	QU-126	A47-100K-S	AB-40	U-41	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	500KΩ	½	B10B-31456	QU-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	1Meg	½	A10A-22305	Q13-137	A47-1Meg-Z	BSK-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R3A
C	Switch		Not Req.	Not Req.	SWZ-12	Not Req.	TB-26	Attach to R3A
R4A	6000Ω ♦ with 1000Ω stop	½	A10B-22304	QU-114	A47-5000-S	AB-10	U-14	Vert. Linearity -Note 1
B	Shaft		Not Req.	Not Req.	KS-2	AK-4	Not Req.	Attach to R4A
R5A	750KΩ ♦ with 250KΩ stop	½	A-10B-23307	QU-133	A47-500K-S			Vert. Size -Note 2
B	Shaft		Not Req.	Not Req.	KS-2			Attach to R5A
R6	3500Ω	½	A10B-22311	QU7-121				Picture
R7A	3Meg	½	B10B-17318	QU-140	A47-2.5Meg-S	AB-84	U-57	Sync Stabilizer
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R7A
R8A	3Meg	½	B10B-17218	QU-140	A47-2.5Meg-S	AB-84	U-57	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R8A

Note 1. Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
Note 2. Connect a 250KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (control viewed from shaft end, terminals down).

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	IRC PART No.	NOTES
R9	470KΩ	½		BTS-470K	
R10	1000Ω	½	9B1-82	BTS-1000	
R11	10KΩ	½	9B1-74	BTS-10K	
R13	10Ω	½	9B1-38	BTS-10	
R13	1000Ω	½	9B1-82	BTS-1000	Note 3
R14	22KΩ	½	9B1-78	BTS-22K	Note 4
R15	220KΩ	½	9B1-27	BTS-220K	Note 2
R16	10KΩ	½	9B1-74	BTS-10K	
R17	2200Ω	½	9 B1-86	BTS-2200	
R18	100Ω	½	9B1-50	BTS-100	
R19	47KΩ	1	9B2-59	BTA-47K	
R20	8200Ω	½	9B1-73	BTS-8200	
R21	1000Ω	½	9B1-82	BTS-1000	
R22	47Ω	½	9B-46	BTS-47	
R23	1000Ω	½	9B1-82	BTS-1000	
R24	1000Ω	½	9B1-82	BTS-1000	
R25	1000Ω	½	9B1-82	BTS-1000	
R26	1000Ω	½	9B1-82	BTS-1000	
R27	22KΩ	½		BTS-22K	Note 1
R28	47Ω	½	9B1-46	BTS-47	
R29	1000Ω	½	9B1-82	BTS-1000	
R30	82Ω	½	9B1-49	BTS-82	
R31	33KΩ	½	9B1-80	BTS-33K	Note 2
R32	1000Ω	½	9B1-82	BTS-1000	
R33	3900Ω	½	9B1-69	BTS-3900	
R34	150KΩ	½	9B1-88	BTS-150K	
R35	15KΩ	½	9B1-76	BTS-15K	
R36	3300Ω	2	9B4-68	BTB-3300	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	IRC PART No.	NOTES
R37	3300Ω	2	9B4-68	BTB-3300	
R38	4700Ω	½	9B1-70	BTS-4700	
R39	100KΩ	½		BTS-100K	
R40	1000Ω	½	9B1-82	BTS-1000	
R41	22KΩ	½		BTS-22K	Note 3
R42	5600Ω	½		BTS-5600	Note 4
R43	220KΩ	½		BTS-220K	Note 2
R44	100KΩ	½	9B1-86	BTS-100K	
R45	120Ω	½	9B1-51	BTS-120	
R46	8200Ω	2	9B4-73	BTB-8200	
R47	47Ω	½	9B1-46	BTS-47	
R48	22KΩ	½	9B1-78	BTS-22K	
R49	22KΩ	½	9B1-78	BTS-22K	
R50	10 Meg	½	9B1-108	BTS-10 Meg	
R51	220KΩ	½	9B1-90	BTS-220K	
R52	470KΩ	½	9B1-94	BTS-470K	
R53	120Ω	½	9B2-51	BTA-120	
R54	1 Meg	½	9B1-98	BTS-1 Meg	
R55	1 Meg	½	9B1-98	BTS-1 Meg	
R56	68KΩ	½	9B1-84	BTS-68K	Note 5
R57	1.5Meg	½	9B1-100	BTS-1.5Meg	
R58	15KΩ	½	9B1-76	BTS-15K	
R59	18KΩ	½	9B1-77	BTS-18K	
R60	47KΩ	½	9B1-82	BTS-47K	
R61	47KΩ	2	9B4-82	BTB-47K	
R62	2.2Meg	½	9B1-102	BTS-2.2Meg	
R63	100KΩ	½	9B1-86	BTS-100K	
R64	100KΩ	½	9B1-86	BTS-100K	Note 5

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	IRC PART No.	NOTES
R65A	22KΩ	½		BTS-22K	
B	8200Ω	½	♦17A-22376	BTS-8200	
C	8200Ω	½		BTS-8200	
R66	100KΩ	½	9B1-86	BTS-100K	
R67	5.6Meg	½	9B1-108	BTS-5.6Meg	
R68	3.3Meg	½		BTS-3.3Meg	Note 6
R69	100KΩ	½	9B1-86	BTS-100K	
R70	2.2Meg	½	9B1-102	BTS-2.2Meg	
R71	180KΩ	1	9B2-89	BTA-180K	
R72	1000Ω	½	9B1-82	BTS-1000	
R73	100KΩ	½	9B1-82	BTS-1000	
R74	150KΩ	½	9B1-88	BTS-150K	
R75	2.2Meg	½	9B1-102	BTS-2.2Meg	
R76	150KΩ	½	9B1-88	BTS-150K	
R77	2.2Meg	½	9B1-102	BTS-2.2Meg	
R78	470KΩ	½	9B1-94	BTS-470K	
R79	68KΩ	½	9B1-84	BTS-68K	
R80	680KΩ	½	9B1-96	BTS-680K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RAYTHEON PART No.	IRC PART No.	NOTES
R81	680KΩ	½	9B1-96	BTS-680K	
R82	2200Ω	½		BTS-2200	
R83	10KΩ	1	9B2-74	BTA-10K	
R84	150KΩ	½		BTS-150K	
R85	330KΩ	½		BTS-330K	
R86	100Ω	½	9B1-50	BTS-100	
R87	470KΩ	½	9B1-94	BTS-470K	
R88	150KΩ	½	9B1-88	BTS-150K	
R89	4700Ω	2	9B4-70	BTB-4700	
R90	1800Ω	1	9B2-85	BTA-1800	Note 2
R91	10KΩ	2	9B4-74	BTB-10K	
R92	5.6Ω	½	9C1-1070		
R93	6Ω	5	46M-22301		
R94	47Ω	15	9M-22837		Note 7
R95A	2200Ω	10	9M-22275		
B	1500Ω	10			
R96	3.9Ω	½	9C1-1070		

Note 1. Some models may use a 33KΩ resistor in this application.
Note 2. Not used in all models.
Note 3. Some models may use a 1800Ω resistor in this application.
Note 4. Some models may use a 3300Ω resistor in this application.
Note 5. Some models may use a 47KΩ resistor in this application.
Note 6. Some models may use a 3 Meg resistor in this application.
Note 7. Some models may use a 150Ω resistor in this application.
♦ Items R65A, R65B, R65C, C67A, C67B, C67C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING: PRI.	RATING: SEC 1	RATING: SEC 2	REPLACEMENT DATA: RAYTHEON PART No	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	115VAC	6.3VAC ①.42A	②5.7A	12D21160-1		P-2947①	F-18X①		P9312	21F11 ②

① Drill one new mounting hole.
② Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	12M-18241-3	A-8125	A-3003	A-97X	209T12②	B6702	TV-24A87 ②
T3	Horiz. Output Trans.	12M-18241 ① C20I-22398B C20I-22396 ③	A-8141	A-3039	A-109X		Z1806	T-26854
T4	Vert. Output Trans.	12C-20761-2					FB412 *	
T5	Yoke-Horiz. (8.3MH)	D13M-21120	DY-8A④	MDF-70④	Y-12④		DF601⑤	
	Yoke-Vert. (45MH)	20I-22697 ④						

① Alternate vertical oscillator transformer.
② Drill one new mounting hole.
③ Alternate horizontal output transformer.
④ Alternate yoke.
⑤ Use original yoke network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
10					1	
2					3	
4					4	
7					7	
8					8	
9					9	
25BQ6 Plate					25BQ6 Plate	
1X2 Plate					1X2 Plate	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC	REPLACEMENT DATA: RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T6	2.6KΩ	3.1Ω	12C22508	A-2928	A-3876	S-2X	Z1901	TS-24550	

SPEAKER

ITEM No.	RATING: SIZE	RATING: FIELD	RATING: V. C. IMP	REPLACEMENT DATA: RAYTHEON PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1A	5"	PM	3.1Ω	18A-21216	ST-105 Mod. P5-X	5A07	① Used in models C-2137A and C-2138A
B	8"	PM	3.1Ω	18A-19927①	ST-115 Mod. P8-V	8A21	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Trans.	.1ΩCT	0Ω	13E-21673				Low band
L2	Ant. Trans.	.1ΩCT	0Ω	13E-22082				High band
L3	Neutr. Coil	0Ω		13M-20781				
L4	RF Choke	0Ω		13M-20780				
L5	RF Choke	.9Ω		16A-17128				
L6	RF Coil	0Ω		13E-12046				Low band
L7	RF Coil	0Ω		13E-17140				High band
L8	Mixer grid coil	0Ω		13E-12046				Low band
L9	Mixer grid coil	0Ω		13E-17140				High band
L10	Fil. Choke	.1Ω		16A-20777				
L11	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L12	Osc. Coil	0Ω		13D-12155				Low band
L13	Osc. Coil	0Ω		13E-17140				High band
L14	RF Choke	.2Ω		16A-21656	19-3001	TV-189	4602	1 Microhenry
L15	RF Choke	2.4Ω		201-20265	19-3036	TV-180	6176	38 Microhenries
L16	1st Video IF	.3Ω		201-22924	17-1003	TV-102 †	6198 †	
L17	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L18	Fil. Choke	.1Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L19	2nd Video IF	.3Ω		201-22927	17-1001 *	TV-100 *	6186 *	Includes 47 MMF capacitor
L20	RF Choke	1.8Ω		16A-18676	19-1002		4606	2.2Microhenries; IRC Part # CLA
L21	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries; Not used in all models
L22	3rd Video IF	.3Ω		201-22929				Includes 27KΩ resistor & 47MMF capacitor
L23	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L24	RF Choke	2.7Ω		201-15608	19-3036	TV-180	4626	20 Microhenries
L25	4th Video IF	.4Ω	.3Ω	13B-22939				
L26	RF Choke	1.8Ω		16A-18676	19-1002		4606	2.2Microhenries; IRC Part # CLA
L27	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L28	Series Peak. Coil	4Ω		16A-22923			6152	25 Microhenries
L29	Series Peak. Coil	4Ω		16A-22923			6152	25 Microhenries
L30	Shunt Peak. Coil	24Ω		16A-19365	19-3500		4648	470 Microhenries
L31	Series Peak. Coil	5.2Ω		16A-20021	19-3125		4644	130 Microhenries
L32	Shunt Peak. Coil	10Ω		16A-19486			4648	380 Microhenries
L33	Shunt Peak. Coil	10Ω		16A-19486			4648	380 Microhenries
L34	Sound IF	3.7Ω		201-22581	17-3400	TV-151	1469	Raytheon Part # includes C51, C52 & R44
L35	Ratio Det.	7.5Ω	1.5ΩCT	13M-22303	17-3497	TV-115	6205	Tertiary winding=.75Ω
L36	Horiz. Osc.	75Ω		201-22302	19-1575	TV-163 †	6210 †	Raytheon Part # includes C83

* Cut out chassis hole, drill mounting holes, add 5 MMF & 47 MMF capacitors. externally & detune trap.
† Enlarge mounting holes.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: RAYTHEON PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L37	.320ADC	70Ω	2.92 Hy.	16A21214	C-2334 ①				

① Drill one new mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: RAYTHEON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.320ADC	21J22274	1023A	RS350	6S350	350A		
M2	.320ADC	21J22274	1023A	RS350	6S350	350A		

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: RAYTHEON PART No.	SYLVANIA PART No.	FEDERAL PART No.	NOTES
M3	1N82		1N82 or 1N82A		UHF Mixer

MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M4	Dial Light	46A-10793	(2 used) #47
M5	Tuner		UHF (Not used in all models)
M6	Tuner		VHF
M7	Switch		UHF-VHF changeover
M8	Centering Magnet	16M-20697	
M9	Ion Trap	16M-19906	
M10A	Correction Magnet	16M-22602	Horizontal linearity
B	Correction Magnet	16M-22607	Anti-in cushion
A23, A24	Trimmer Cap.	8E-17142	Dual 5-20MMF ant. trimmers
	Cabinet	24D-22818	Model M-2131
	Cabinet	24D-22892	Model C-2137
	Cabinet	24D-22893	Model C-2138
	Knob	5B-22637	Tuning
	Knob	5B-22613	Picture & volume
	Knob	5B-20755-29	Star knob (3 used)
	Knob	5B-23047	Sync stabilizer
	Safety glass	30M-21485	
	Escutcheon Assy.	200-22559	

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, switch on volume control and T1. If filaments light, check R93, M1, M2 and other associated components.

SMALL AND/OR DIM PICTURE

Check M1 and M2. Check other B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check R92, T3, T5A, R89, R90, C87, C90 and other associated circuit components.	Check C84, C85, C86, R87, R88 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check B+ at the 230V point.

If Satisfactory	If Unsatisfactory
Follow procedure outlined under "Loss of High Voltage".	Follow procedure outlined under "Small and/or Dim Picture".

BLOOMING

Check by substitution V17, V18 and V19. Check R91, R92, C5, C1, C2, C3A, T3, T5A, M1, M2, filter choke, picture tube and other associated components.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO PICTURE NO SOUND

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check associated circuit components.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

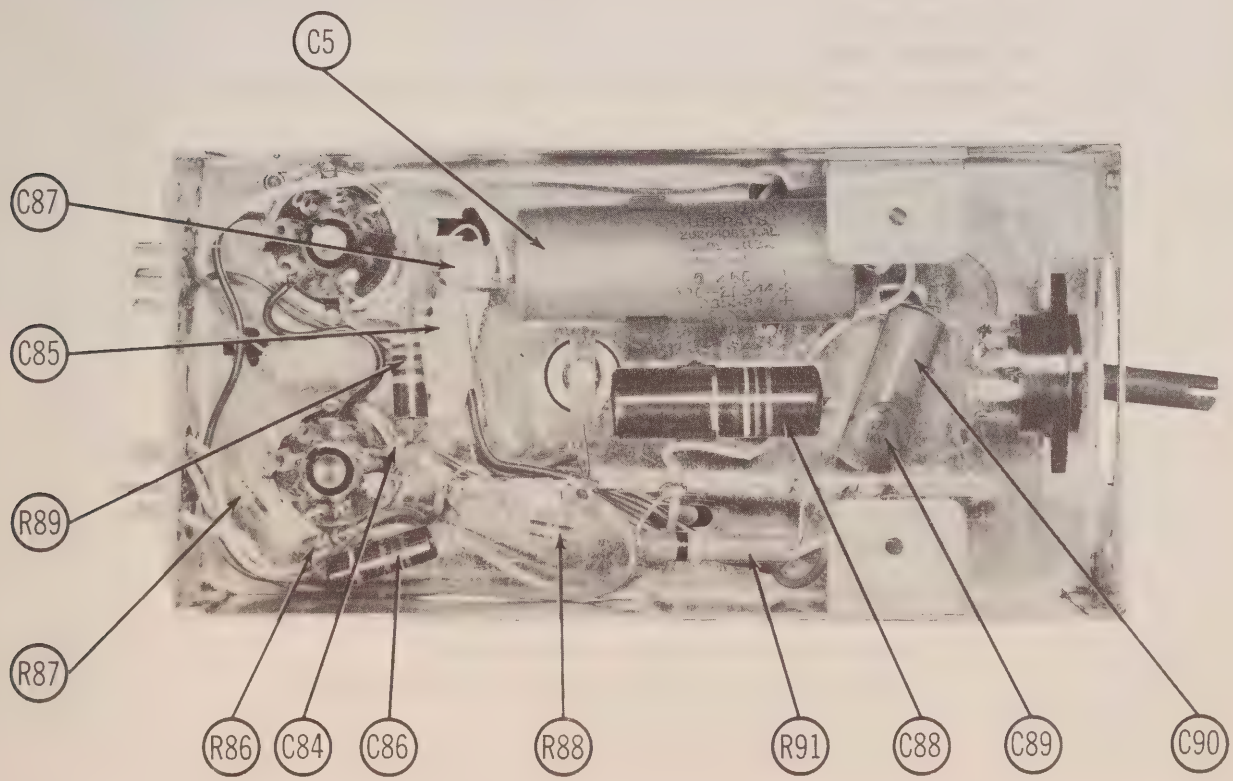
KEYSTONE EFFECT

Check T5, C91, R72 and R73.

INTERMITTENT STREAKS

Check high voltage sections for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



POWER SUPPLY CHASSIS-BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

No touch-up adjustment of the tuner oscillator circuit . See alignment instructions on pages 6 and 7.

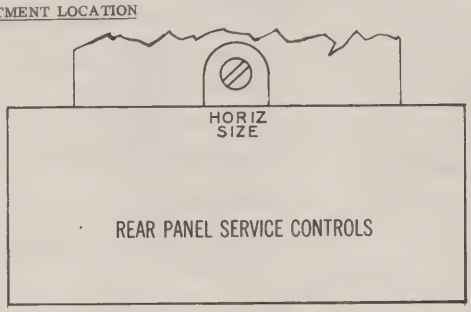
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 metal screws holding metal strip at the bottom of safety glass. Remove metal strip and safety glass using extreme caution at all times.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at center of its range and adjust the horizontal oscillator slug (L36) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L35) located on top of chassis. (See tube placement chart).

FUSES

One fuseable resistor is used for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of picture tube and located flush against the yoke. Turn the round (disc-like) knob and at the same time rotate the ring around the tube until picture is properly centered.

BUILT-IN ANTENNA TUNING

Built-in antenna can be adjusted from rear of the cabinet. Adjust for a picture of maximum contrast and minimum ghosts.

ANTI-PIN CUSHION ADJUSTMENT

The anti-pin cushion magnet is located just to the right of yoke. Adjust centering until the left edge of the raster becomes visible. Loosen the wing nut and slide the magnet until the edge of raster is vertical and straight.

HORIZONTAL LINEARITY M AGNET ADJUSTMENT

Loosen the wing nut (to left of yoke), and slide the magnet until the picture is symmetrical from left to right. This magnet affects the linearity of the right side of the picture only.

DISASSEMBLY INSTRUCTIONS

1. Remove 1 push-on type control knob and counter weight from front panel.
2. Remove 4 metal screws and loosen set screw. Remove front panel.
3. Remove 6 push-on type control knobs after front panel is removed.
4. Remove 6 wood screws and 1 metal screw. Remove rear cover.
5. Disconnect speaker plug, CRT socket, yoke plug, HV plug and built-in antenna.
6. Remove 8 chassis bolts. Remove chassis.
7. Remove 2 speaker nuts. Remove speaker.

PROPERTY OF
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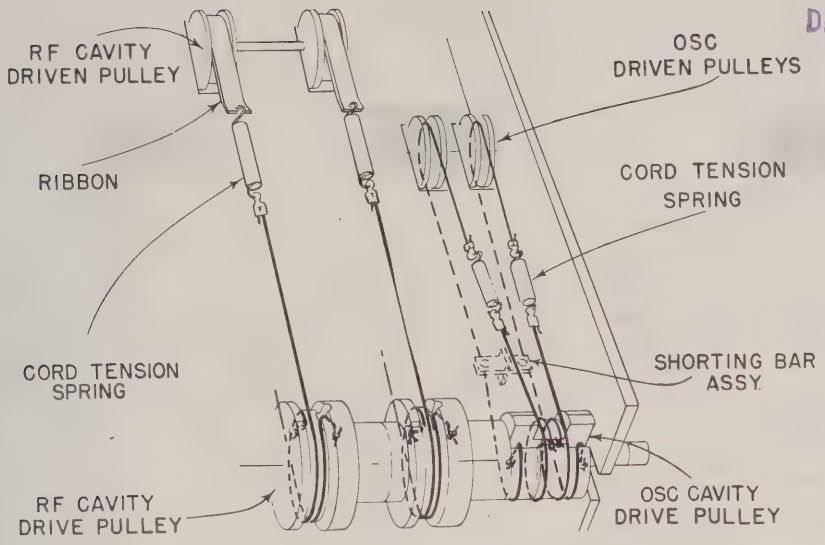
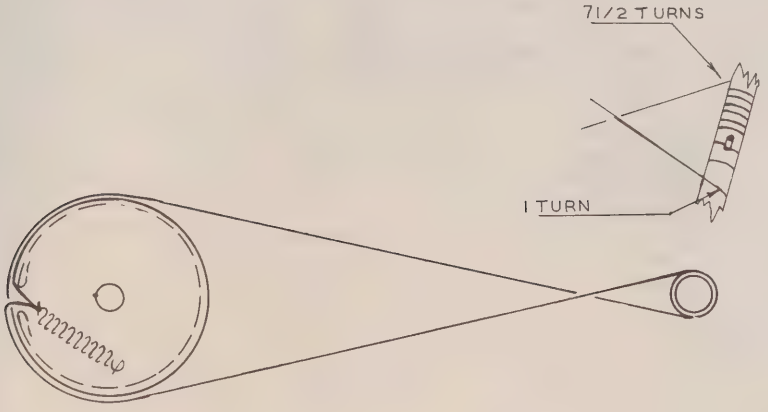
3824 MEADE ST.
DENVER, COLORADO

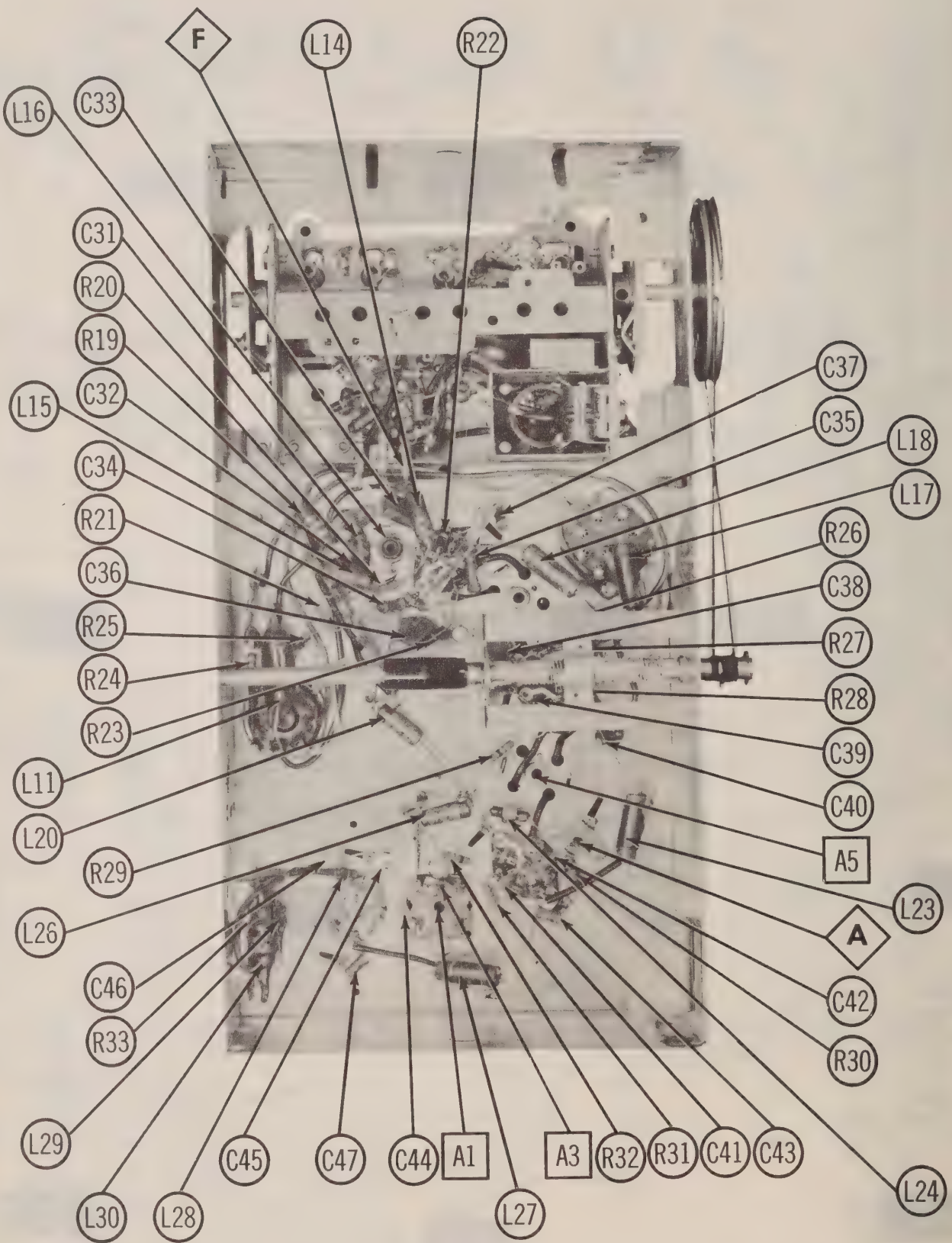


UHF DRIVE CORD STRINGING



TUNING SHAFT FULLY COUNTERCLOCKWISE.

TUNING DRIVE CORD STRINGING



RF-IF CHASSIS-BOTTOM VIEW

PROPERTY OF
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DENVER, COLORADO

SILVERTONE
CHASSIS 488.219

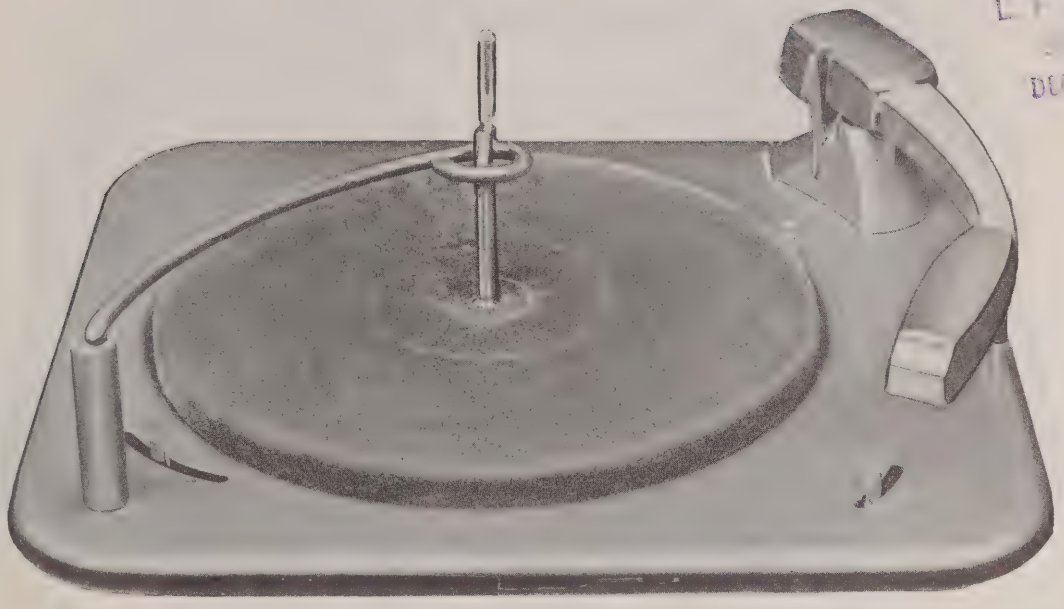

Figure 1

SPECIFICATIONS

The 488.219 Intermix Record Changer is designed to automatically play 78RPM, fine-groove 45RPM, and long-play 33 1/3RPM records of standard commercial dimensions. Records up to 12" in diameter can be played.

This changer will automatically play as many as ten-12", twelve-10", or any assortment of ten-12" and 10" records of the same type (78RPM or 33 1/3RPM) intermixed.

A full stack of twelve-7", 33 1/3RPM, long-play records, a full stack of twelve-7", 45RPM, fine-groove records (with the use of an adaptor) or a full stack of twelve-7", 78RPM records (children's records) with lead-in and finishing grooves will also automatically play on this changer.

Those children's records and home recordings that do not have lead-in and finishing grooves must be played manually (See "Manual Operation").

The last record will be repeated until the changer is turned off.

Connect this changer only to an outlet supplying 117 volts, 60-cycle AC unless otherwise specified.

Supplied by:

Sears, Roebuck & Co.
925 S. Homan Street
Chicago 7, Illinois

Parts should be ordered from the nearest Sears, Roebuck & Co.
Retail Store or Mail Order Branch

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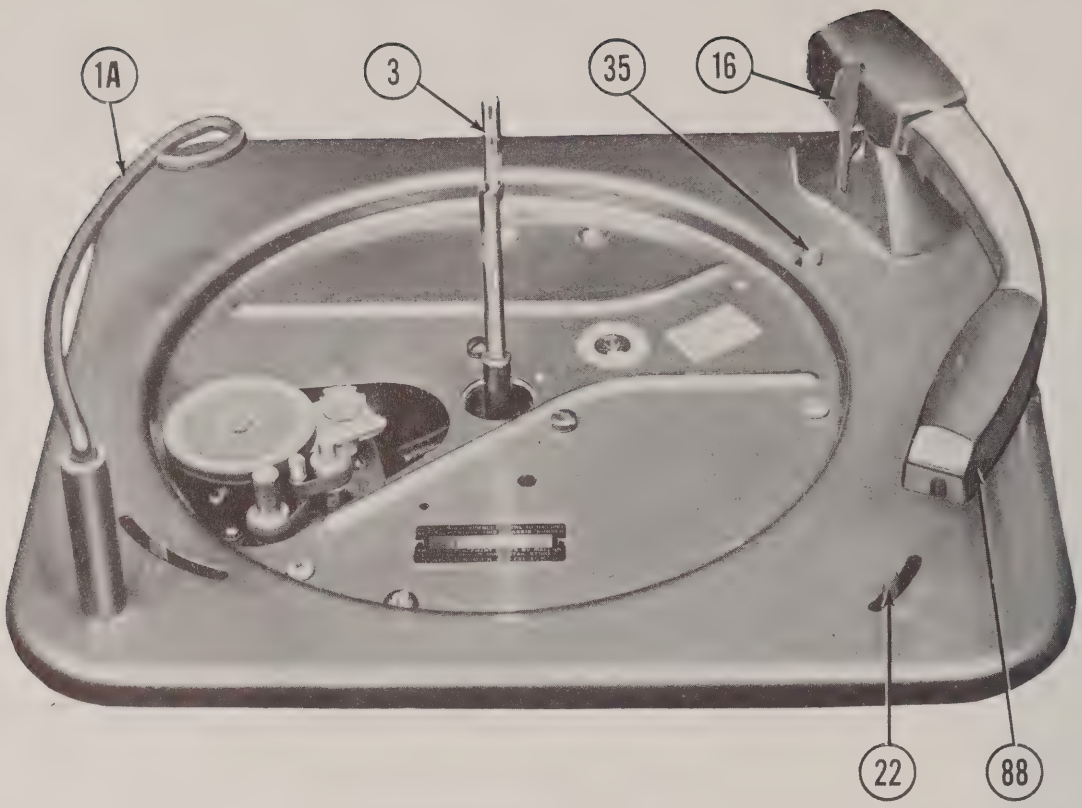

Figure 2

OPERATION

Loading-

1. Pull straight up on record support knob until the record support clears spindle. Swing record support to the left until pin in shaft drops into locating groove.

2. This changer will automatically play ten 12" either standard or long-play records, twelve 10" either standard or long-play records, any assortment of ten 12" and 10" records intermixed, or twelve 7" long-play or fine-groove records.

PREPARING FOR OPERATION

Shipping Bolts-

Before placing in operation, the machine must be floated freely on the mounting springs. During shipment, the mechanism is secured by means of two shipping bolts (17). To float the changer, remove the "C" washer from the spindle and remove the turntable by lifting it straight up the spindle. Turn the two shipping bolts in a clockwise direction as far as possible and replace the turntable. Before the turntable can be fully seated, the idler wheel must be gently pushed back out of the way to prevent damage to the motor.

Leveling Record Changer-

It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to achieve perfect level.

NOTE: Standard, fine-groove, and long-play records cannot be intermixed. The motor speed control lever must be reset for each type or recording.

3. Place records on spindle and lower to offset shelf. Hold records level and replace record support over spindle.

To Play Standard (78RPM) Records-

1. The motor speed control lever must be in the "78" position.

2. To start, turn changer control lever to "Rej." and release. Changer will operate automatically until the last record has been played, at which time the last record will be repeated until the changer is turned off.

To Play Fine-Groove (45RPM) Records-

1. The motor speed control lever must be in the "45" position.

2. Most of these records are manufactured with a 1 1/2" spindle hole. It is essential that a record adaptor be used with all large hole records.

To Play Long-Play (33 1/3RPM) Records-

1. The motor speed control lever must be in the "33" position.

Rejecting-

To reject a record at any time while the changer is operating, turn changer control lever to "Rej." and release.

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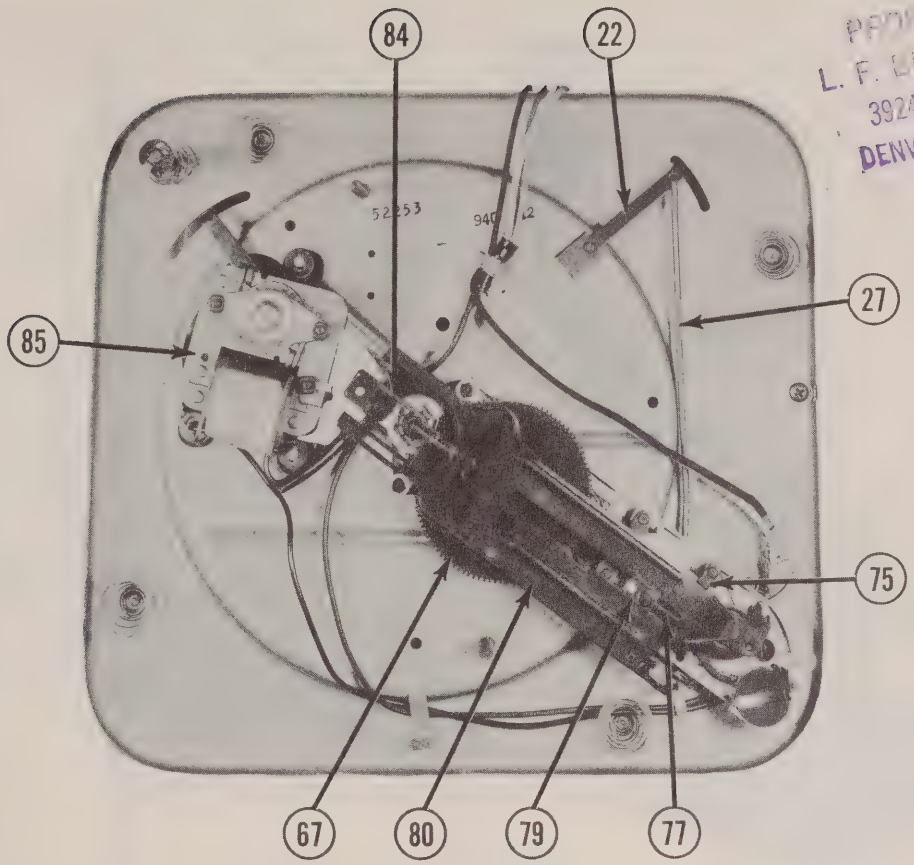

Figure 3

Stopping-

To turn off changer, turn changer control lever to "Off" and carefully place pickup arm on rest.

Unloading-

Lift the record support and swing to the left until pin in shaft drops into locating groove. Lift stack of records straight up and off spindle.

Manual Operation-

To play children's records and home recordings that do not have lead-in and finishing grooves, lift the record support arm and move it to the left until clear of the turntable. Place record on spindle and lower to spindle shelf. Tilt record down toward the rear of pickup arm and lower to turntable. Turn changer control lever to "On" position only. Raise pickup arm gently place needle in lead-in groove of record.

Suggestions-

When loading and unloading the changer, use care to prevent bending the spindle. Records should not be left on spindle except during operation of changer. Records will warp. When machine is not in use, it is suggested that the motor control lever be left in the "78" position. For best reproduction keep needle and records clean.

CHANGE CYCLE

It is recommended that the change cycle operation be observed by rotating the turntable by hand. The action described below can then be readily followed and the function of each part more easily understood.

This changer is provided with what is known as a velocity trip mechanism. The change cycle is started by the faster inward motion of the pickup arm when the needle enters the trip grooves at the end of the record. Only records having fast finishing grooves before the eccentric cycling groove will operate this velocity trip.

The pickup arm and hinge assembly and trip finger cam and shaft assembly (64) are secured at opposite ends so that they move in unison. As the pickup arm nears the end of a record, the trip finger cam (64) pushes the trip link (73), which, in turn, engages the trip lever (72) rotating the pawl lever (70) to move the trip pawl toward the hub on the turntable. While a record is playing. The small motions of the trip pawl are not sufficient to cycle the mechanism because on each revolution of the turntable the wiping contact by the hub projection moves the trip pawl back to clear the projection.

During the first revolution of the turntable in which the pickup arm advances rapidly, the trip pawl is moved far enough to definitely engage the projection on the turntable hub. The gear on the turntable hub will now engage the main gear (67) and start its rotation. This in turn, starts the lateral motion of the slide and cam assembly (80). The slide and cam assembly (80) moves to the rear through the action of an eccentric pin on the main gear (67) moving in the cross slot on the slide and cam assembly (80).

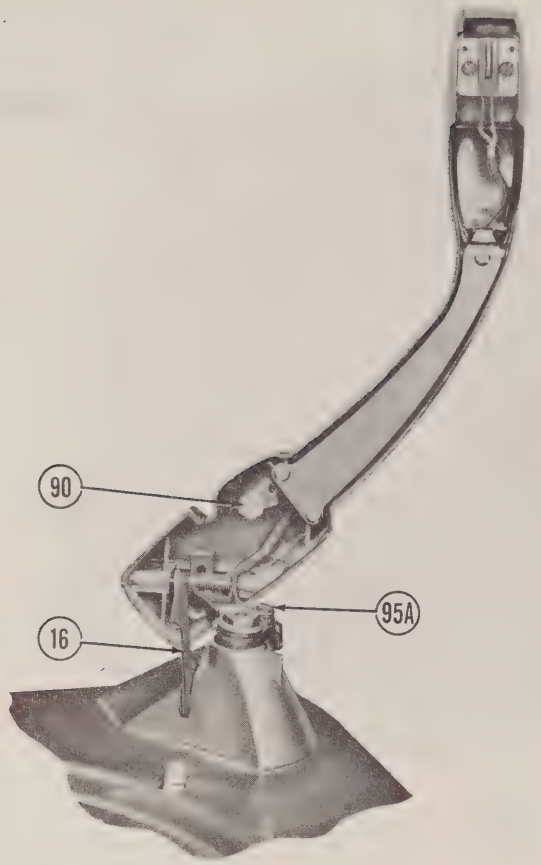

Figure 4

As the slide and cam assembly begins to move, the cam surface at the rear pushes the lift pin (15) upward, raising the pickup arm clear of the record. At the same time, the tab on the rear of the slide and cam assembly (80) contacts the trip finger cam (64) swinging the pickup arm clear of the turntable.

The front edge of the ejector link slot in the slide and cam assembly (80) then contacts the ejector link on the ejector link assembly (84). The ejector link moves the pusher shaft and housing assembly (10) upward actuating the spindle assembly (3), causing the record pusher (6) to move straight up so as to enter the center hole of the record, and then to be pivoted forward, dropping a record to the turntable. (See Figure 5).

Simultaneously, the tab on the rear of the slide and cam assembly (80) contacts the pickup arm return locator (60), moving it clear of the reset lever (54). The pickup arm return locator (60) is now locked in position with the trip finger cam (64) by means of matching holes in the pickup arm return locator (60) and detents in the trip finger cam (64). This is accomplished by the pressure of the compressed conical lift spring (65) overcoming the pressure of the lift pin compression spring washer (63).

At the same time, the cam surface of the bracket on the main gear assembly (67) moves the reset lever (54) to mid-position (10" set-down) where it is held by the 12" record selector (16). The slide and cam assembly (80) continues to the rear and then starts forward. If 7" records are being changed, the rubber bumber (35) of the 7" set-down lever (51) is free to

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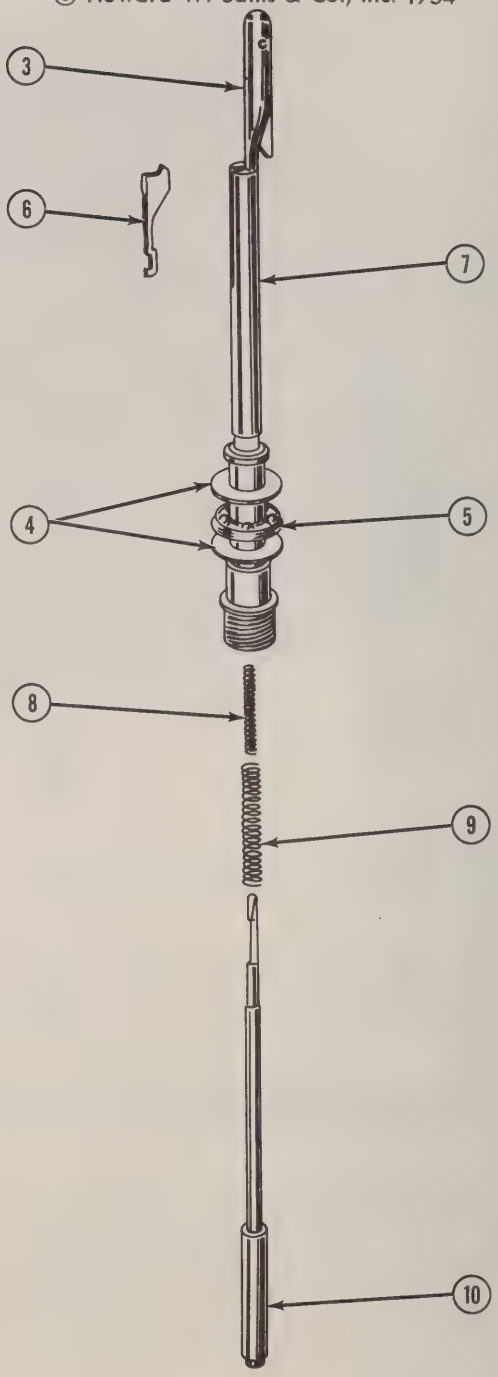

Figure 5

move upward permitting the other end to drop into the hole in the main gear (67) as this gear rotates. This action of the 7" set-down lever (51) raises the reset lever (54) to the upper position (7" set-down).

If 10" records are being changed, the 7" set-down lever (51) will not operate as the rubber bumper (35) will contact the edge of the record and the reset lever (54) will remain in the mid-position (10" set-down) as originally placed by the caming action of the bracket on the main gear (67).

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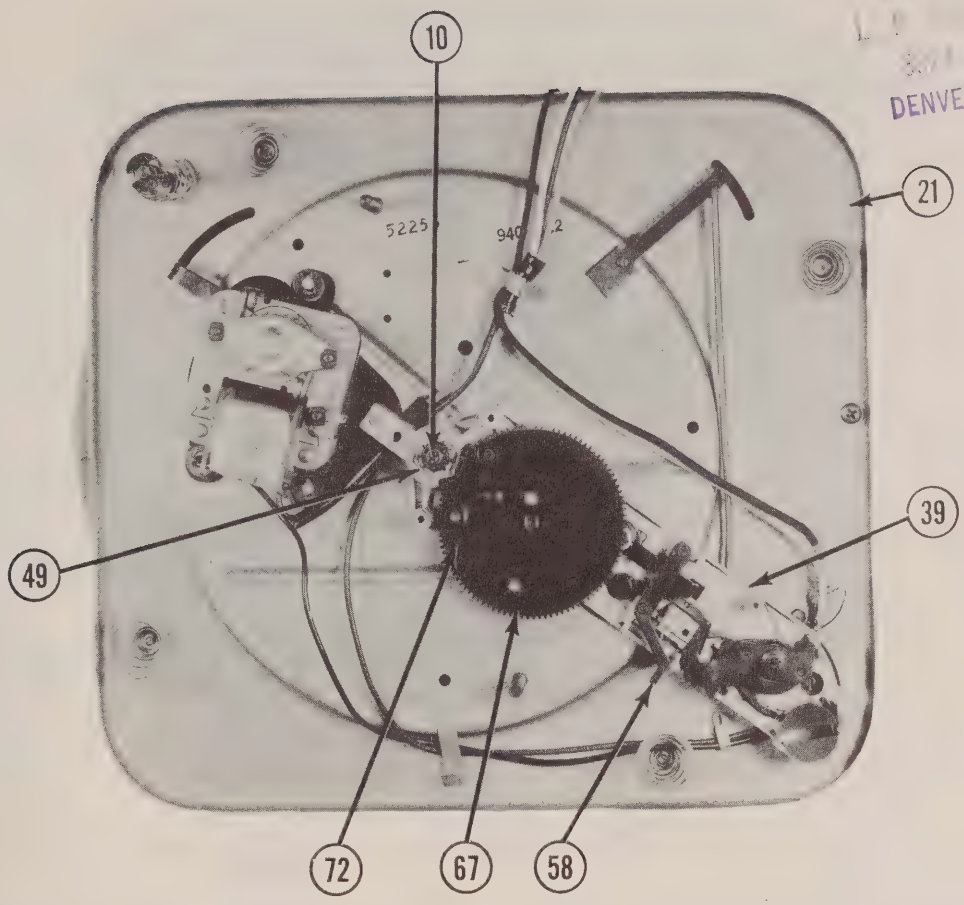

Figure 6

If a 12" record is being changed, the edge of the record strikes the 12" record selector (16) releasing the reset lever (54) which drops to the bottom position (12" set-down).

As the slide and cam assembly (80) continues forward, the tab on the rear of the slide will move clear of the pickup arm return locator (60) and trip finger cam (64), which are still locked together. These rotate under the action of the pickup arm return spring (43) until one of the three set-down steps in the pickup arm return locator (60) strikes the reset lever (54), which has been positioned by the record being changed (see above). This stops the inward movement of the pickup arm return locator (60), trip finger cam (64) and pickup arm. The pickup arm is then lowered to the lead-in grooves of the record as the lift pin (15) rides down the rear cam surface of the slide and cam assembly (80). As the pressure is released from the conical lift pin spring (65), the lift pin compression spring washer (63) separates the pickup arm return locator (60) and trip finger cam (64), permitting the pickup arm to ride freely across the record.

Just before the main gear assembly (67) completes its cycle, a small tab (A) on the slide and cam assembly (80) makes contact with the trip lever assembly (72) thereby moving pawl lever (70) and trip lever assembly (72) back. This prevents the pawl lever (70) from engaging with the projection on the turntable hub when the cut-away portion of the gear teeth stop the movement of slide (80).

The change cycle is completed as the pin on the bottom of main gear assembly (67) moves into the indentation in the center of the cross slot of slide (80). This action holds the "dead spot" or cut-away portion of main gear assembly (67) to the turntable gear.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high-operating temperature, the changer should be lubricated as follows: (Refer to the exploded view).

Apply Andok "B" or Texaco Sta-Put to:

1. Edges of all slots in slide and cam assembly (80).
2. Outer edges of tines on forked end of slide and cam assembly (80).
3. Lift pin cam surface on slide and cam assembly (80).
4. Lower surface of pickup arm return locator (60).
5. Inner surface of tab on rear of slide and cam assembly (80).

Apply a small quantity of light mineral oil to:

1. Trip finger cam shaft (64).

ADJUSTMENTS

Needle Set-Down (Refer to Figure 4)-

The set-down position of the needle is adjusted by means of the set-down adjustment screw (95A) which

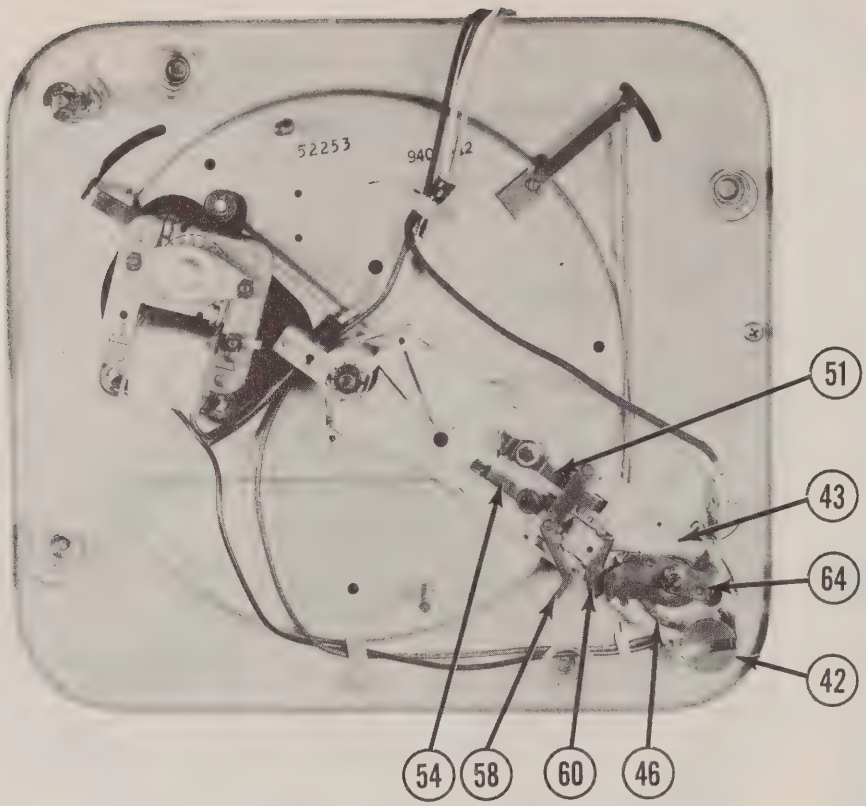

Figure 7

is mounted on the hinge arm assembly. Turn this screw adjusting pickup arm for correct set-down on a 10" record. When the correct set-down is obtained for the 10" position, the 12" and 7" needle set-down will also be correct.

Pickup Arm Height (Refer to Figure 4 and Exploded View Of Tone Arms)-

The pickup arm height is adjusted, on some arms, by the lift screw (90) located at the rear of the strengthener. On other type arms, the height is adjusted by bending the ear on the rear of the strengthener (99). The pickup arm height should be adjusted so that with a 1 1/8" stack of records on the turntable the pickup arm lifts 1/4" straight up as the change cycle starts.

Needle Pressure (Refer to Figure 4 and Exploded View of Tone Arms)-

The needle pressure should be between 10 and 12 grams. Adjustment may be made by loosening screw (100) on the slide which moves in a slot in the tone arm strengthener. Move the slide back or forward until the correct needle pressure is obtained. On arms not having the above adjusting point, adjustment may be made by bending the spring on the hinge assembly (95).

TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Turntable does not revolve when control is turned to "On".	1. No current at motor.	(a) Check that current is reaching AC leads of changer.
		(b) Check that switch is closing.
		(c) Check wiring and soldered terminals in the changer.
	2. Motor defective.	(a) Remove turntable to allow motor to operate without load. If current is reaching motor and drive spindle does not rotate, the motor is defective. Repair or replace.
	3. Motor idler wheel not engaging turntable rim.	If drive spindle is turning but turntable is not: (a) Check motor idler assembly to determine if it is free to contact the drive spindle and turntable rim. (b) Wipe off inside rim of the turntable (2) to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel with naphtha, or alcohol.

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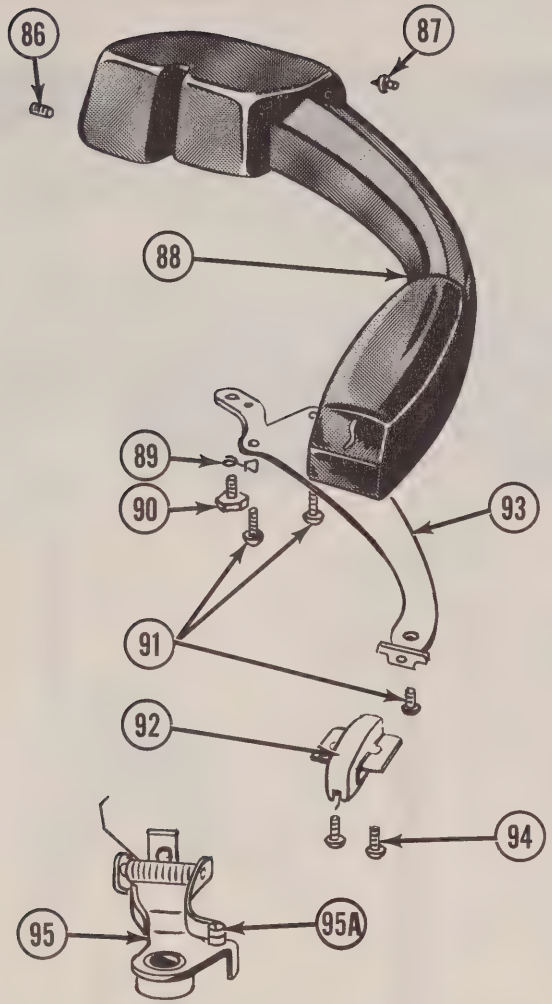

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Figure 8

TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
Changer does not cycle when the control lever is turned to "Reject".	1. The manual reject not actuating the trip.	(a) Turn the control lever (22) to the reject position, hold and see that the control shaft assembly (46) has moved the trip link (73) to the rear. This should actuate the trip pawl on the main gear (67), which will bring the spur on the trip pawl in contact with the hub gear on the turntable hub. (b) Check for binding of the pawl lever (70), the trip lever assembly (72) and the trip pawl. If binding occurs, clean out all foreign matter and check for freedom.
Control lever cannot be turned to "On" position.	1. Machine shut off during cycle.	Turn the turntable clockwise, by hand, until the control lever (22) is free.
Pickup arm strikes records on spindle when it raises, or pickup arm rest when it moves out.	1. Pickup arm height not adjusted properly.	See instructions for adjusting pickup arm height under "Adjustments".
Turntable speed too slow (refer to exploded view).	1. Binding in turntable bearing.	Check the turntable bearing for freedom. Hold the motor idler wheel out of engagement with the turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, clean off foreign matter, and lubricate with light mineral oil.

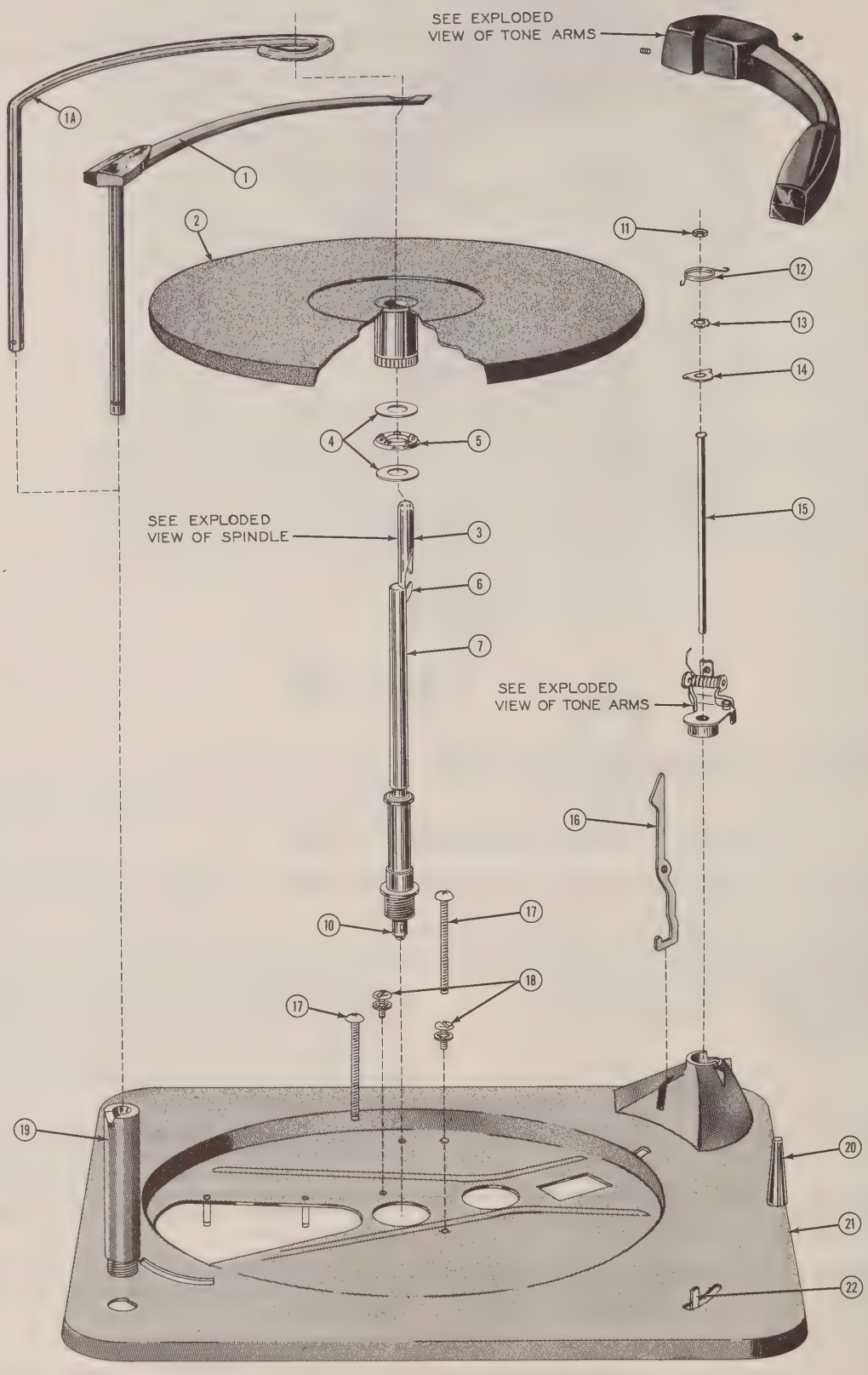

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Figure 9A. Exploded View of Parts Above Baseplate.

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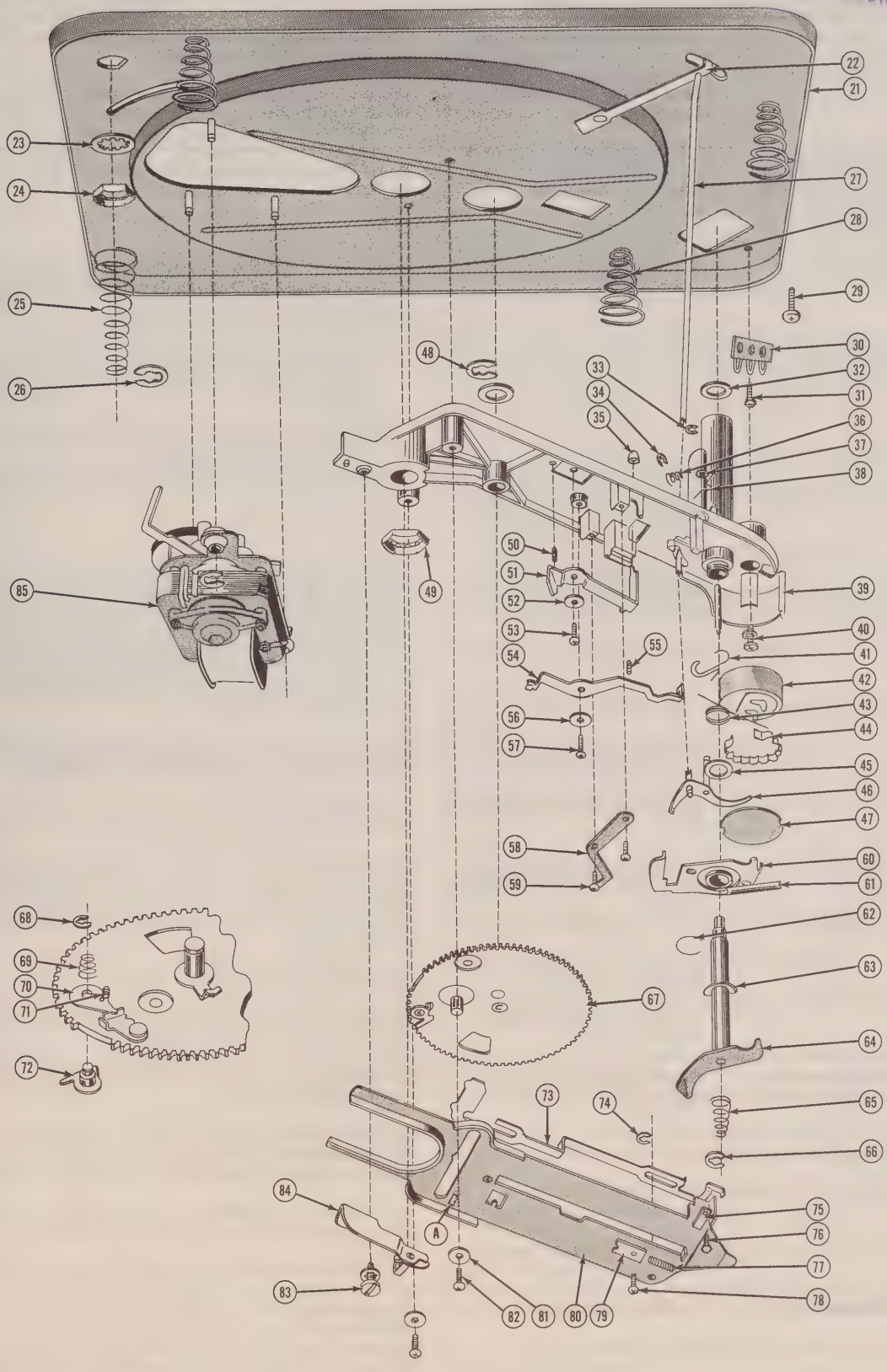

Figure 9B. Exploded View of Parts Below Baseplate.

TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
	2. Line voltage too low.	The line voltage should not be less than 105 volts or the turntable may be too slow.
	3. Operating temperature too low.	If the machine has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.
Turntable stalls or slows down during cycle (refer to exploded view).	1. Motor idler not engaging turntable.	See "Turntable Does Not Revolve When Control Knob Is Turned To "On" Position".
	2. Binding in drive mechanism.	Hold idler away from turntable, or remove idler wheel. Cycle machine by turning turntable slowly by hand. The main gear should turn freely for the complete revolution without binding at any point. (a) If binding occurs, check for foreign matter in the gear teeth, a bent gear bearing, or bent spindle bushing. Straighten or replace. Clean and lubricate.
	3. Binding between pick-up arm lift pin (15) and lift pin cam surface on slide and cam assembly.	Lift pin should ride freely on cam surface without binding.
	4. Spindle pusher spring compressing too far.	Cycle the changer and watch the relationship between the bottom of the pusher housing and the lower button of the pusher housing. Just before the slide and cam (80) has completed its backward motion, the pusher housing should stop its upward motion and the lower button should continue up .005 to .047" more, slightly compressing the pusher spring. If the spring compresses to much, the changer may stall.
	5. Motor weak.	When everything checks all right, but the changer still stalls in cycle, the motor may be weak.
	6. Grease on idler wheel.	1. Wipe off idler wheel rubber tire; inner rim of turntable and rubber belts with naphtha or alcohol.
	7. Turrets unseated from lock ring on turret shaft.	Remove turret and center lock ring. (If lock ring is distorted, replace with new lock ring.) Replace turret and press down to assure turret of being locked to the turret shaft. (Turret will snap into position when properly locked.)
	8. Idler slide bent.	Straighten and clean or replace.
	9. Idler wheel tension spring weak.	Replace spring or bend motor tension spring anchor bracket to give desired tension.
Changer continues to cycle.	Reject Mechanism binding.	(a) Make certain the trip link (73) is not frozen in the reject position. (b) Make certain the changer control lever (46) is not binding and that it actuates the trip link (73) when the changer control lever (22) is turned to reject. (c) Check for binding of trip pawl, trip lever (72) and pawl lever (70); these must be free to turn easily. (d) Check the changer control linkage, (27) and (46).
Noise during playing of record.	1. Motor rumble.	If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check motor grommets to be sure the motor is freely suspended on them. The motor lead wires should have slack to allow the motor to float. Motor rumble may also come from an unbalanced motor rotor; in this case, replace the motor.

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TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
	2. Defective turntable bearings (5).	Defective turntable bearings can cause rumble. Check for foreign matter in the bearing, defective balls, binding between balls and ball retainer; rough surface on washers. Clean ball bearing, sleeve bearing, and washers; lubricate with light mineral oil.
	3. Defective motor idler wheel or speed pulleys.	A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel or speed pulleys. If this condition does not clear up after ten minutes of running time, remove the turntable and check the rubber tire on the idler or pulleys. If the surface of the rubber tire is not smooth and even, replace the part. Should the bearing of the idler wheel show signs of excessive wear or be extremely wobbly, the idler wheel should be replaced.
	4. Defective record.	Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "Wow" (a waver in the recorded sound). An enlarged hole in the record can also cause "Wow".
	5. Turntable scrapes.	If a scraping sound occurs as the turntable revolves, check: (a) Turntable warped, causing outer rim to rise and fall. (b) Motor idler or mounting plate bent.
	6. Squeaks.	Squeaking sound as changer operates indicates lack of oil. Lubricate points indicated under "Lubrication".
	7. Pulleys on motor not properly seated.	Check that pulleys are properly seated.
	8. 7" lever (51) loose.	Check 7" lever washer (52) and screw (53) to see if they are tight.
Distortion of Recorded	1. Defective record.	See "Noise During Playing Of Record".
	2. Defective amplifier.	Check phonograph amplifier and speaker.
	3. Bad cartridge.	Replace.
No Sound During Playing.	1. Defective cartridge.	Replace.
	2. Defective wiring.	Check pickup leads for a shorted or open lead.
	3. Defective amplifier.	Check phonograph amplifier and speaker.
	4. Loose cartridge terminal clips.	Remove, squeeze together slightly, and replace.
Excessive Record Wear.	1. Binding on pickup arm.	See "Needle Does Not Track Across Record Properly".
Rough pickup arm motion.	1. Horizontal defects.	(a) Check pickup arm return locator (60) for tightness. (b) Check that pickup arm return spring (43) is not weak and is hooked up properly. (c) Check that fiber washer (45) is installed under pickup arm return locator.
	2. Vertical defects.	(a) Lift pin (15) binding; clean out dirt and lubricate. (b) Slide and cam (80) binds; check bearing points -- clean and lubricate. (c) Burrs in main slot in slide and cam (80) -- remove with fine file.

TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
		(d) Ejector lever on ejector bracket assembly (84) binding in slide and cam slot; straighten, remove burrs, and lubricate. (e) Pickup arm shaft and sleeve binding; clean and lubricate.
Noise during change cycle.	1. Tines on the forked end of the slide and cam assembly (80) bent.	Replace.
	2. Lack of lubrication, grinding noise.	Lubricate ejector lever (84) where it contacts lower end of spindle (10).
Cartridge drage on record.	1. Needle bent.	Replace needle.
	2. Cartridge mounting screws loose.	Tighten.
Will not play manually.	1. Trip link (73) bent.	Straighten or replace.
	2. Trip finger cam (64) bent.	Straighten or replace.
Impossible to adjust set-down.	1. Pickup arm shaft and sleeve assembly (64) defective.	Shift the safety plate (14) toward the eccentric set-down adjusting screw (95 A), and tighten pickup arm shaft and sleeve nut (11). Hold pickup arm against rear stop and push on trip finger cam (64). The safety plate (14) should move away from the set-down adjusting screw (95 A) and snap back when the trip finger cam (64) is released; if it does not, replace the pickup arm shaft and sleeve assembly (64). Hinge pivot screws may be adjusted favoring one side or the other.
Record does not drop when changer cycles.	1. Spindle pusher shaft and housing assembly (10) broken.	If the pusher shaft (inside the spindle) is broken, the lower end (housing) will drop out of the spindle (7) (see Figure 5). Loosen spindle nut (49) and remove spindle (3). Replace with new spindle unit.
	2. Record pusher (6) in spindle not moving far enough forward to reject a record.	The record pusher should move up inside the spindle body (7), then move forward until it has reached a point flush with, or a maximum of, .010" beyond the spindle body (7). To insure that the record pusher (6) is all the way forward, the lower button on the shaft and housing assembly (10) should be raised high enough by the ejector lever to slightly compress the pusher spring inside the pusher shaft and housing assembly (10). See ("Turntable Stalls During Cycle"). If the spring is compressed and the record pusher (6) does not move far enough forward to eject a record, the spindle (3) should be replaced. If a record is not pushed completely off the ledge, it may hang on the spindle momentarily, then drop on the pickup arm when it moves in over the turntable.
	3. Record pusher (6) raises outside the spindle body (7).	When changer cycles, the record pusher (6) should rise up just inside the spindle body, then move forward inside the center hole in the record. If the record pusher (6) rises outside the spindle body (7), it will raise the record instead of pushing it off the spindle ledge. Remove the spindle (3) and replace with a complete new spindle assembly.
Two records drop at once (refer to exploded view and Figure 5).	1. Hole in record too large.	Check the diameter of the hole in the record. An oversize hole will cause two records to drop at once.
	2. Spindle guide not fully down.	If the spindle guide is not all the way down, more than one record may be dropped at a time.

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SYMPTOM	CAUSE	REMEDY
		(a) Check the guide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten if necessary. Do not oil.
		(b) When records are placed on the spindle, be sure the guide is all the way down. The guide will normally raise as a record is being dropped, but it should return to place immediately, by gravity.
	3. Record pusher (6) defective.	The record pusher (6) may be deformed, etc. This may cause two records to drop at once. Replace with new pusher or replace spindle assembly.
	4. Slight play in spindle (3).	Tighten spindle nut (49). If stripped, replace.
Record hits pickup arm (refer to exploded view).	1. Record pusher (6) not moving far enough forward to eject record.	See "Record Does Not Drop When Changer Cycles" #2.
	2. Record pusher (6) extending beyond outside diameter of spindle.	Cycle changer, by hand, until pusher shaft and housing assembly (10) is at the top of its travel. Using new record as a gauge, pass it over the spindle to see if it binds at any point. File off high points on record pusher (6), with a fine file, until record will pass freely over spindle.
	3. Pickup arm not adjusted properly.	See "Adjustments".
Needle does not set down on 10" record in proper position (refer to exploded view).	1. Pickup arm not adjusted properly.	See "Adjustments".
		(a) Loose nut (11) on pickup arm shaft and sleeve (64).
	2. Pickup arm shaft and sleeve (64) binding.	File off burrs and rough surfaces. Polish and lubricate shaft.
	3. 7" set-down lever (51) and 12" record selector (16) not operating properly.	Insure that the proper operation and reset of the 7" set-down lever (51) and 12" record selector (16) is not being interfered with.
	4. Needle bent.	Replace with new needle.
	5. Wire spring (38) broken.	12" record selector (16) does not cock; check for broken 12" record selector spring (38).
	6. Bent pickup arm return locator (60).	Straighten or replace.
	7. Bent trip finger cam (64).	Straighten or replace.
Needle does not set down on 12" record in proper position (refer to exploded view).	1. Diameter of 12" record undersize.	The set-down position of the needle for 12" records is determined by the edge of the record striking the 12" record selector (16). If a 12" record has a diameter of less than the standard size of 11-7/8" plus or minus 1/32", it may fail to depress the 12" record selector far enough.
	2. Enlarged center hole in record.	An enlarged center hole might fail to set the 12" record selector because it could produce the same effect as a small record.
	3. Pickup arm not adjusted properly.	See "Adjustments".
	4. Binding of pickup arm shaft and sleeve (64).	Clean and polish shaft (64), and lubricate with light oil.
	5. Reset lever spring (55) broken.	Replace spring (55).

TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
	6. 12" record selector spring (38) broken.	Replace spring (38).
	7. 12" record selector (16) binding.	The 12" record selector must be free to operate smoothly. Clean out dirt and straighten if bent, or replace.
	8. Bent pickup arm return locator (60).	Straighten or replace.
	9. Bent trip finger cam (64).	Straighten or replace.
Needle does not set down on 7" record properly.	1. 7" set-down lever spring (50) borken or weak.	Replace
	2. Pickup arm not adjusted properly.	See "Adjustments".
	3. 7" set-down lever screw (53) loose.	Tighten.
	4. 7" set-down lever (51) hitting frame or baseplate where it goes through hole in frame.	Straighten or replace.
	5. Reset lever (54) bent.	Replace.
	6. 7" set-down lever (51) does not fall into opening in main gear.	Replace.
	7. Bent pickup arm return locator (60).	Straighten or replace.
	8. Bent trip finger cam (64).	Straighten or replace.
Changer does not cycle when record has been played.	1. No finishing trip groove on record.	Check record for eccentric trip groove in center of record. Some old records and home recordings do not have this eccentric trip groove.
	2. Needle jumps out of grooves in record.	(a) Check trip pressure; the lateral pressure should not exceed 3 grams. If pressure is excessive, see "Changer Trips Before Needle Reaches End Of Record". (b) The record may be defective; the finishing groove is often too shallow. Check with a record that is known to be good. (c) The needle point may be damaged or affected by an excessive accumulation of dust, lint, etc.; check needle pressure as described under "Adjustments". (d) There may be binding in the pickup arm shaft and sleeve assembly (64) or between the pickup arm return locator (60) and the trip finger cam (64); see "Needle Does Not Track Across Record".
	3. Trip pawl binding on gear face.	The trip pawl must be free to move forward and engage the boss on the turntable hub when the trip lever releases it. Check for burrs or foreign matter lodged between the trip pawl and main gear (67). Do not oil as this might collect dirt and gum up the pawl.
	4. Trip finger cam (64) bent.	Straighten or replace.
	5. Trip link (73) bent.	Straighten or replace.
Changer trips before needle reaches end of record.	1. Hole in record too large.	If the hole in the record is too large, the groove may turn eccentric with the spindle and cause premature tripping.

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SYMPTOM	CAUSE	REMEDY
	2. Binding of trip link (73).	With the trip link released, check the trip link for freedom of motion. It should be free to move without binding.
Needle does not track across record properly.	1. Needle may be clogged by accumulation of lint, dirt, etc., or worn.	(a) Clean foreign material from around needle. (b) Check needle to see if the tip is bent or broken. Replace, if necessary.
	2. Trip finger cam (64) does not disengage from the pickup arm return locator (60) when cycle is completed.	There should be a 1/32" gap between the trip finger cam (64) and the pickup arm return locator (60) when the machine is not in cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the compression spring washer (63) may be weak or broken. Replace.
	3. Check the bearing in the pickup arm post for binding.	(a) Check pickup arm return locator (66) and trip finger cam (64) for binding. (See 2 above).
	4. Pickup leads too tight.	Give the pickup leads enough slack to allow the tone arm to move freely across a record.
	5. Changer not level.	See "Leveling Record Changer". Page 2.

PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	K5604-B	Record Support Assembly	40	K101	Screw, 10-24x3/8 Sems B.H.
		3286-A15 Plastic Button	41	K3901	Reject Spring
1A	K4962-J	Record Support, Wire	42	K467	Switch
2	K2528-A	Turntable Assembly	43	K4938	Return Spring-Pickup Arm
3	K3668	Spindle & Bearing Assembly	44	K2931	Fiber Insulating Strip
		Consists of:	45	K4950	Fiber Washer
		K3667 Spindle Assembly	46	K2284	Control Shaft Assembly
		less Ball Race & Washers	47	K2573	Switch Cover
4		K1568 Bearing Washer	48	K1719	"C" Washer-Main Gear Assy.
5		K1569 Bearing	49	K2208	Pal Nut Spindle Mounting
6		K1529 Record Pusher	50	K2579	Spring-7" Set-Down Lever
7		K2537 Spindle Body &	51	K2581	7" Set-Down Lever
		Base Assembly	52	K492	Washer-7" Set-Down Lever
8		K1527 Pusher Spring	53	K4856	Screw, 6-32x5/16
9		K2552 Pusher Shaft Spring	54	K2560	Reset Lever
10		K2539 Pusher Shaft &	55	K2925	Spring-Reset Lever
		Housing Assembly	56	K492	Washer-Reset Lever
11	K3887	Jam Nut, #1/4-28	57	K4856	Screw, 6-32x5/16
12	K4937	Safety Spring	58	K3904	Trip Link Reset Arm
13	K3888	Lockwasher, #1/4	59	K2932	Screw, 4-40x1/4
14	K4339	Safety Plate	60	K2561	Locator Plate
15	K4327	Lift Pin	61	K4212	Retainer-Switch Cover
16	K2957	12" Record Selector	62	K2271	Retaining Ring-Locator Plate
17	K2077	Shipping Bolts	63	K2953	Spring Washer
18	K101	Screw, #10-24x3/8 Sems B.H.	64	K4331	Trip Finger Cam & Shaft Assy.
19	K4960	Record Support Post	65	K3962	Lift Pin Spring
20	K2558-G	Pickup Arm Rest Post	66	K1588	"C" Washer
21	K4965	Baseplate Assembly	67	K5418	Main Gear Assembly
22	K4958	Control Lever	68		K1588 "C" Washer
23	K5262	Lockwasher, 1/2"	69		K4172 Spring
24	K2208	Pal Nut	70		K5339 Pawl Lever
25	K2546	Record Support Holddown Spring	71		K5338 Spring
26	K2110	"C" Washer	72		K2569 Trip Lever Assy.
27	K4929	Shut-Off Rod	73	K2958	Trip Link
28	K2578	Mounting Springs	74	K1588	"C" Washer
29		Screw	75	K4706	Slide Support
30	K2951	Terminal Strip	76	K2932	Screw, 4-40x1/4
31	K4856	Screw, 6-32x5/16"	77	K2246	Spring
32	K2952	Fiber Washer	78	K4856	Screw, 6-32x5/16
33	K1652	"C" Washer for Item 46	79	K2211	Slide Bearing
34	K1588	"C" Washer for Item 16	80	K2288	Slide Assembly
35	K2580	Rubber Bumper	81	K2274	Washer-Slide Bearing
36	K4172	Compression Spring for Item 16	82	K4856	Screw, 6-32x5/16
37	K1720	Speed Nut	83	K101	Screw, 10-24x3/8
38	K2563	Spring-12" Record Selector	84	K2571	Ejector Link Assembly
39	K4330	Die-Cast Frame	85	K4973	Motor

PARTS LIST - Con't.

Ref. No.	Part No.	Description
		K2797 Drive Belts
		K3090 33 1/3 Pulley
		K3089 45 Pulley
		K2772 Idler Wheel
		K3088 Idler Wheel Ten.Spring
		K6175 Idler Arm Assy.
86	K4923	Hinge Pivot Screw
87	K6326	Hinge Button Bearing
88	K3423	Tone Arm
89	K2255	Lock Spring
90	K2912	Lift Screw
91	K713	Strengthener Screws
92	K3797	Cartridge-Sonotone W-7590-2
93	K3282	Strengthener
94	K2904	Cartridge Mounting Screws
95	K4544	Hinge Arm Assembly

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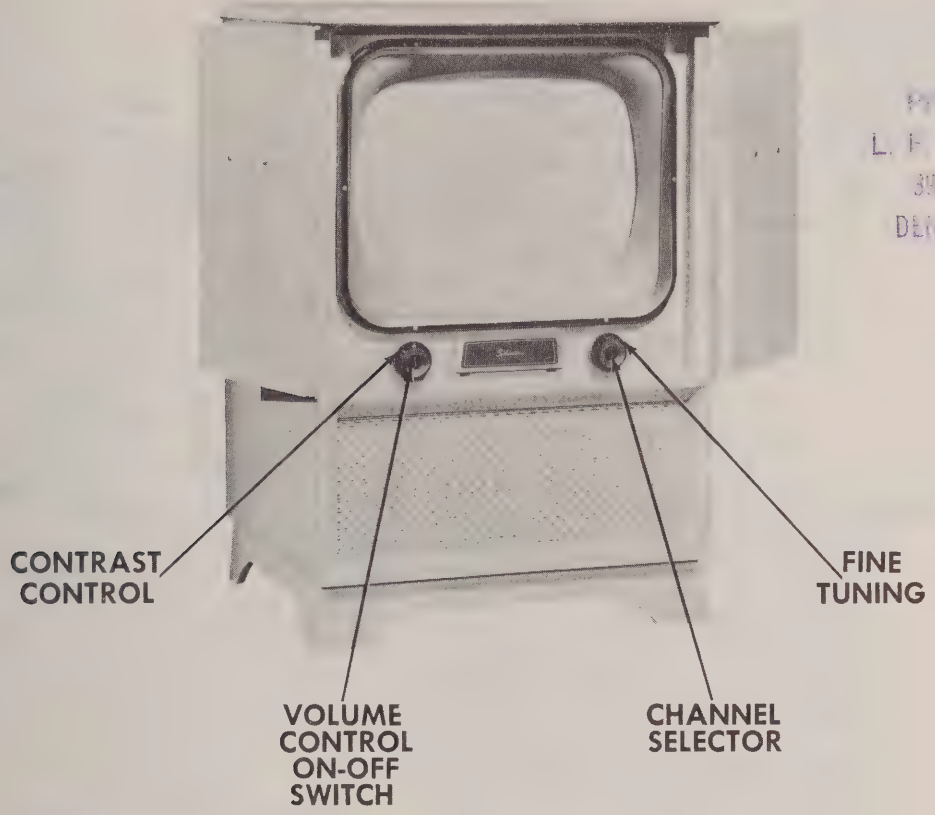

SILVERTONE MODEL 3187A

TRADE NAME	Silvertone Models 3177A, 3187A (Ch. 100.400)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.54 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13, Video IF 26.6MC, Sound IF 22.1MC (Intercarrier)

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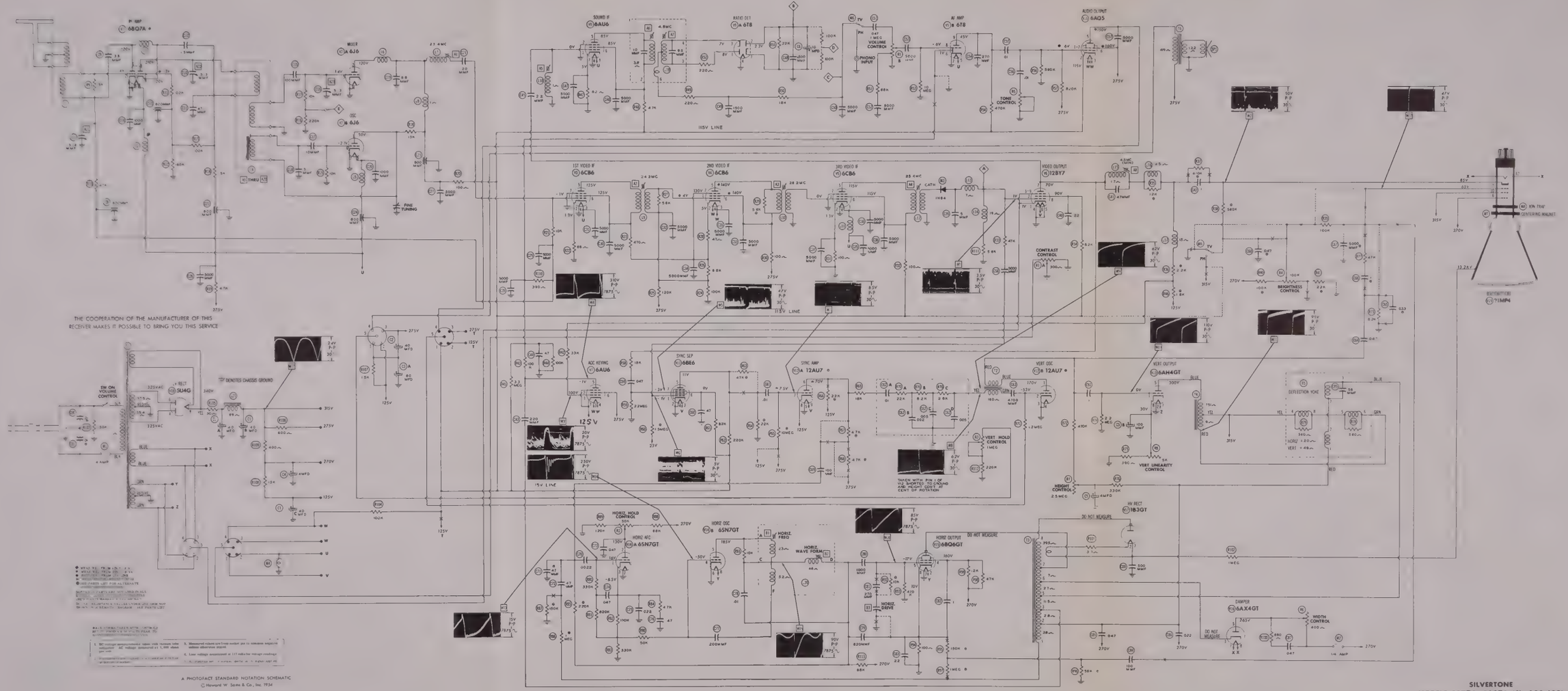
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THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
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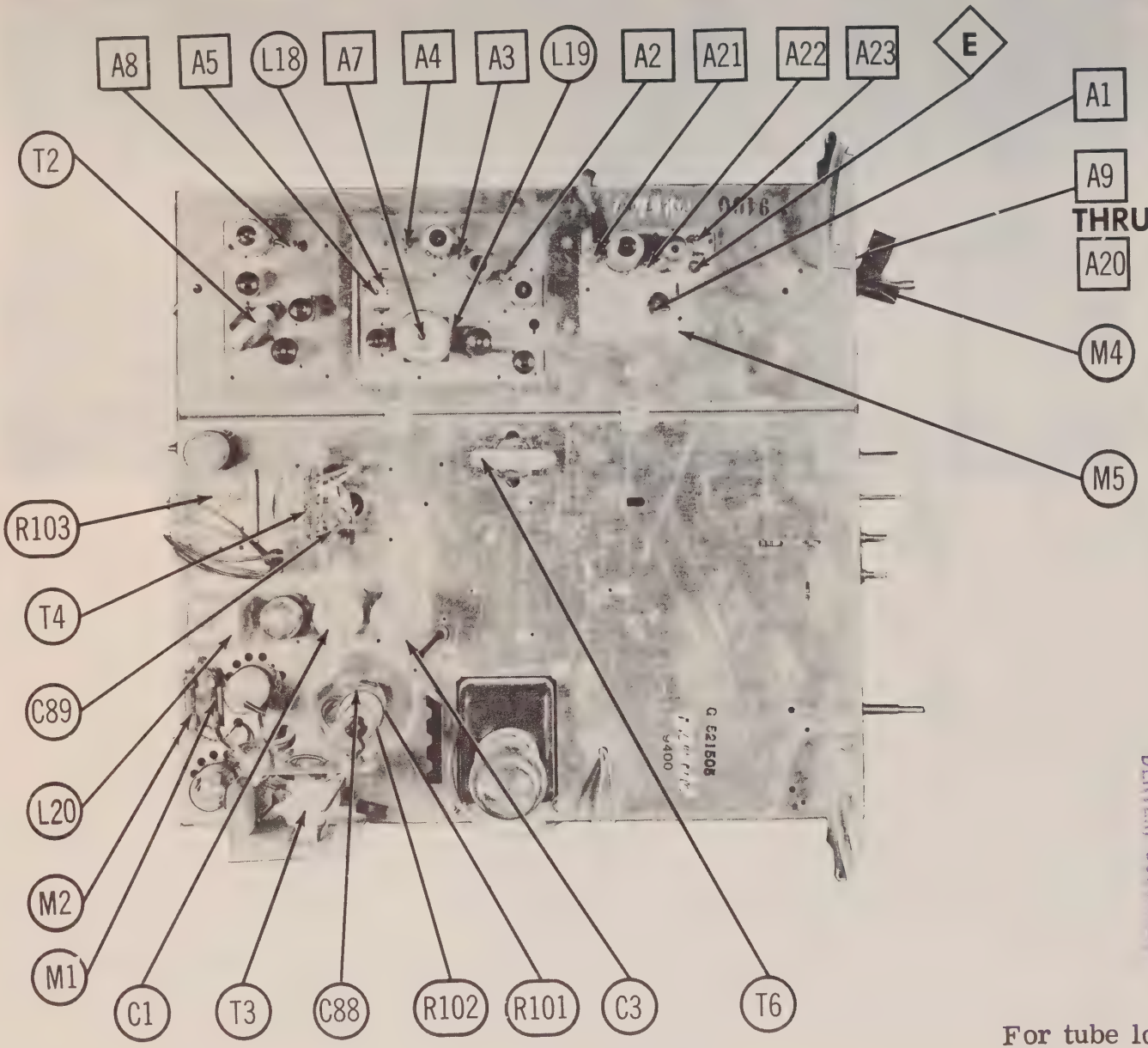
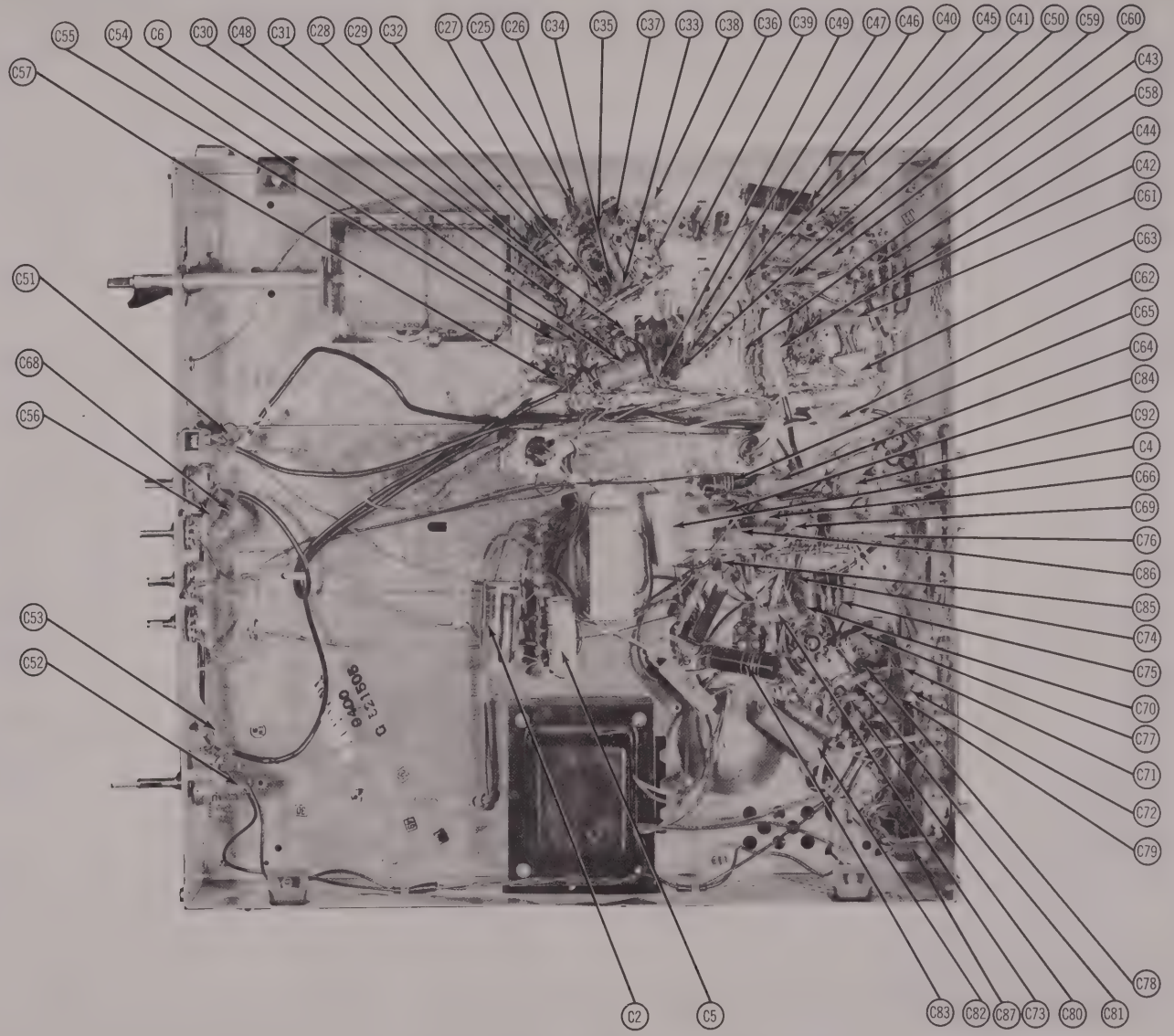


CHASSIS TOP VIEW

For tube location see tube placement chart page 5.



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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TUBE PLACEMENT CHART

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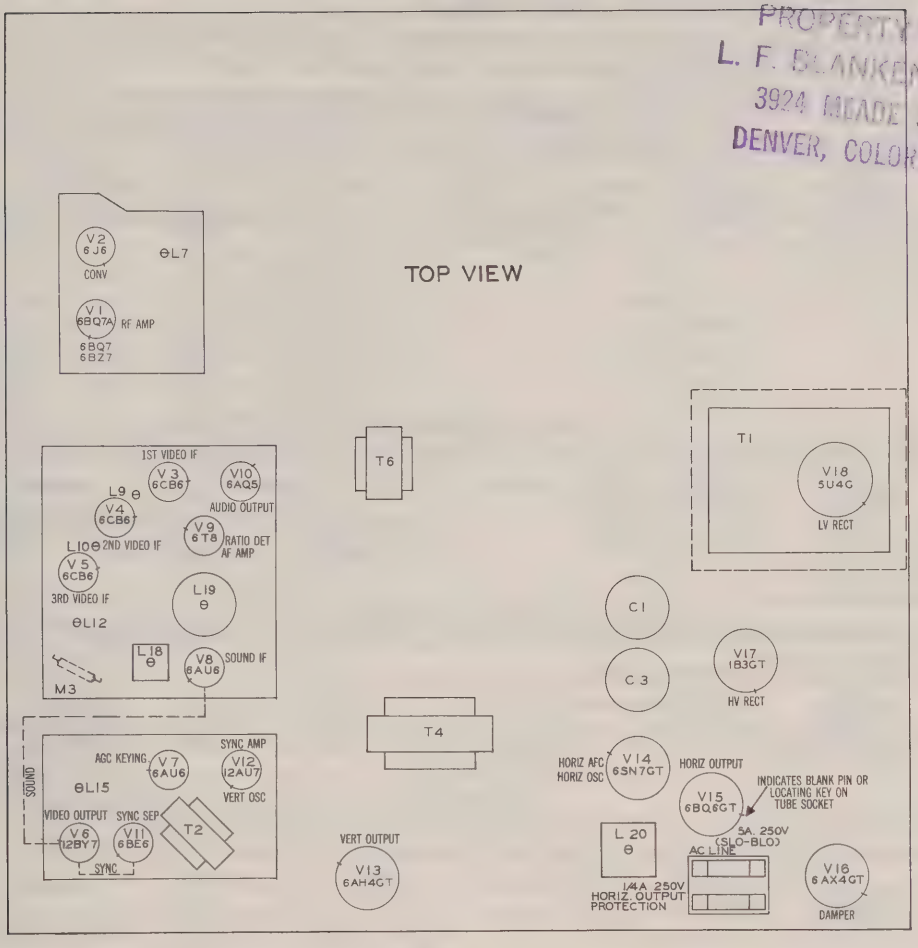

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V18, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V10
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V19
Has pic, no sound - V8, V9, V10
Overloaded picture -V7

SYNC FAILURE
No vert. sync - V12
No horiz. sync - V12, V14
No vert. or horiz. sync - V11, V12

SWEEP FAILURE
No raster, has sound -V14, V15, V16, V17, V19 Fuse (M2)
No vertical deflection - V12, V13
Poor vert. linearity or foldover - V12, V13
Poor horiz. linearity or foldover - V14, V15, V16
Narrow picture - V14, V15, V16, V17, V18, V19
Vert. off freq. -V12
Horiz. off freq. - V12, V14

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V14).

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 3 volt battery to the ungrounded side of C44. Connect the positive lead to chassis.
Use Truetone IF alignment tool #507479 (or equivalent).
When the IF channel is badly misaligned, two or more stages may break into oscillation as evidenced by excessive voltage at point (A). This voltage will be unaffected by strength of signal from the generator. In such cases the condition may generally be corrected by detuning the IF coils in a different direction. If the oscillation persists increase the AGC bias from -3 volts to -4.5 volts. Once the stages have been aligned and become stable reduce the fixed bias to -3 volts and repeat the IF alignment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	23.4MC (Unmod)	Any	DC probe to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	24.2MC	"	"	A2	"
3.	"	"	26.2MC	"	"	A3	"
4.	"	"	25.4MC	"	"	A4	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to an ungrounded tube shield floating over dummy coverter tube. Low side to chassis.	25MC (10MC Swp)	22.1MC 26.6MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig.1. If necessary, retouch A1 thru A4 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.
Set contrast control ot its fully counter clockwise position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B) Common to chassis.	A5, A6	Adjust for maximum deflection.
7.	"	"	"	"	DC probe to point (C) Common to point (D)	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A5, A6	Disconnect stabilizer capacitor C6. Adjust for curve of maximum amplitude and symmetry as in fig.2.
7.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A7	Reconnect stabilizer capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig.3. SLIGHTLY retouch A6 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig4). Common to chassis.	A8	Adjust for MINIMUM deflection.

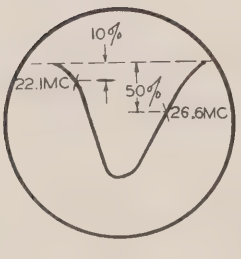

FIG.1

FIG.2

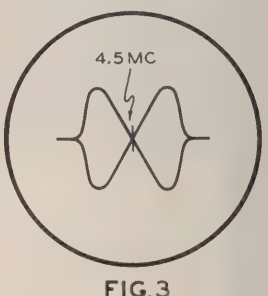

FIG.3

ALIGNMENT INSTRUCTIONS (cont)

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OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Leave bias supply connected as under video IF alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms .
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω carbon resistors	Across antenna termin terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. amp. to point (A). Low side to chassis.	A9	Adjust to place sound marker as shown in Fig. 5. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A10	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A11	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A12	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A13	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A14	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A15	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A16	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A17	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A18	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A19	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A20	

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Leave bias supply connected as under Video IF alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A21, A22 A23	Adjust for response curve similar to Fig.6 with markers above 90% .
11.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response curve similar to Fig.6. If markers fall below 70% on any channel make slight compromise adjustments of A21, A22 and A23, with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

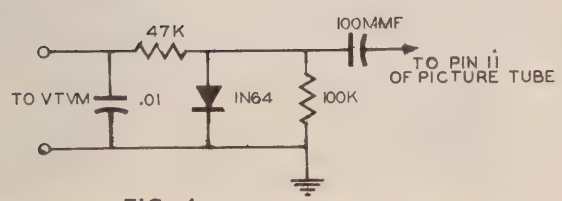


FIG. 4

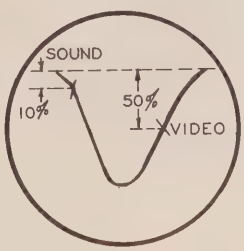


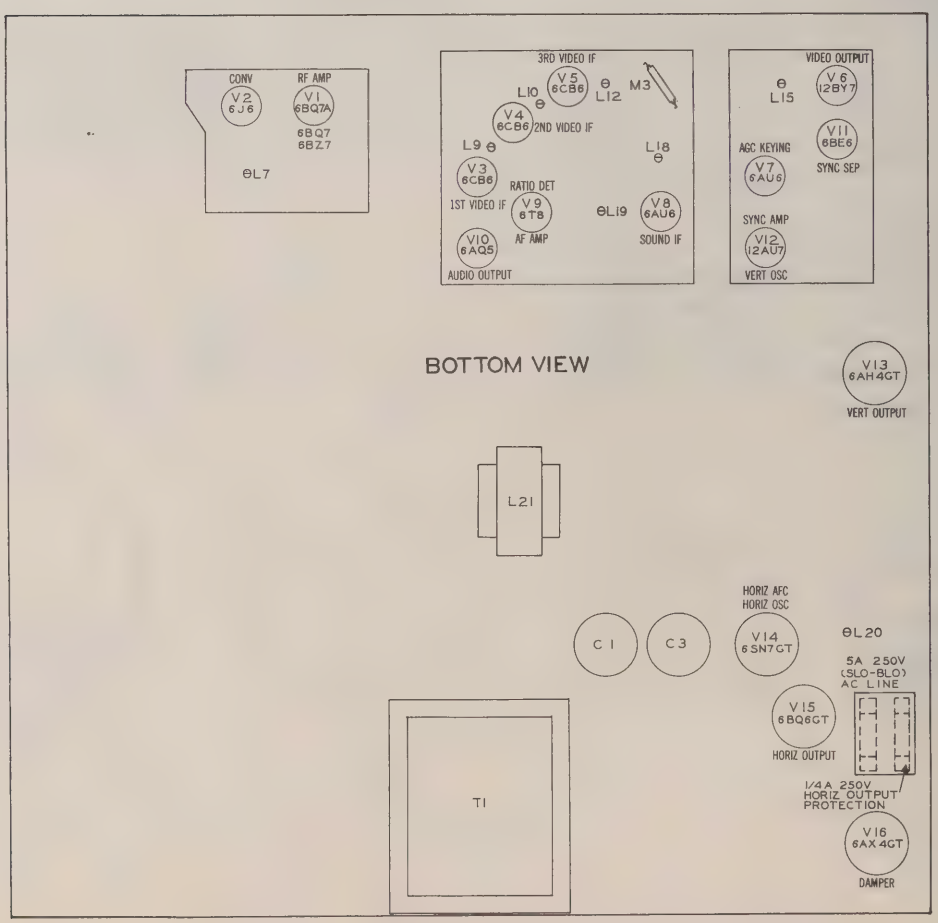
FIG. 5

FIG.6

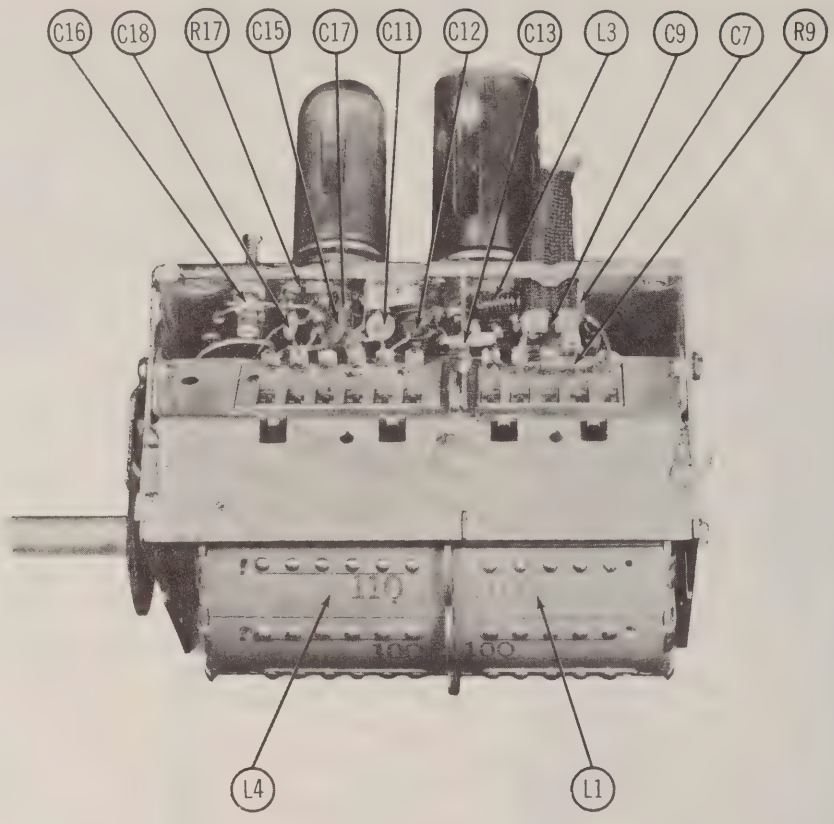
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	150KΩ	0Ω	.1Ω	0Ω	†6.9KΩ	†200KΩ	INF	0Ω
V 2	6J6	†32KΩ	†17KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	110KΩ	68Ω	.1Ω	0Ω	†130KΩ	†130KΩ	0Ω		
V 4	6CB6	†120KΩ	†128KΩ	†115KΩ	†115KΩ	†800Ω	†800Ω	107KΩ		
V 5	6CB6	.5Ω	100Ω	.1Ω	0Ω	■100Ω	■100Ω	0Ω		
V 6	12BY7	55Ω	5.6KΩ	55Ω	0Ω	0Ω	.1Ω	†20KΩ	■8.2KΩ	55Ω
V 7	6AU6	†50KΩ	†15KΩ	†115KΩ	†115KΩ	200KΩ	†770Ω	†15KΩ		
V 8	6AU6	1Ω	0Ω	.1Ω	0Ω	■4.7KΩ	■4.7KΩ	82Ω		
V 9	6T8	INF	22KΩ	INF	0Ω	.1Ω	100KΩ	0Ω	10Meg	■470KΩ
V 10	6AQ5	350KΩ	†12KΩ	†115KΩ	†115KΩ	†1KΩ	†700Ω	350KΩ		
V 11	6BE6	†1.5Meg	0Ω	.1Ω	0Ω	■220KΩ	■82KΩ	2.2Meg		
V 12	12AU7	#2Meg	2Meg	0Ω	0Ω	0Ω	†9KΩ	†10Meg	†15KΩ	.1Ω
V 13	6AH4GT	2.2Meg	0Ω	†115KΩ	2.2Meg	†850Ω	†115KΩ	.1Ω	1.8KΩ	
V 14	6SN7GT	1.8Meg	†65KΩ	430KΩ	480KΩ	†68KΩ	0Ω	.1Ω	0Ω	
V 15	6BQ6GT	†500Ω	.1Ω	INF	†12KΩ	470KΩ	†68KΩ	0Ω	100Ω	TOP CAP #17Ω
V 16	6AX4GT	INF	†1.2KΩ	600KΩ	†500Ω	†550Ω	†500Ω	†115KΩ	†115KΩ	
V 17	1B3GT		PINS 1 - 8 HAVE INF RESISTANCE							TOP CAP #413Ω
V 18	5U4G	INF	40KΩ	INF	35Ω	INF	37Ω	INF	40KΩ	
V 19	21MP4	†115KΩ	†250KΩ	PIN 6 †500Ω	PIN 10 †100Ω	PIN 11 †330KΩ	PIN 12 †115KΩ			

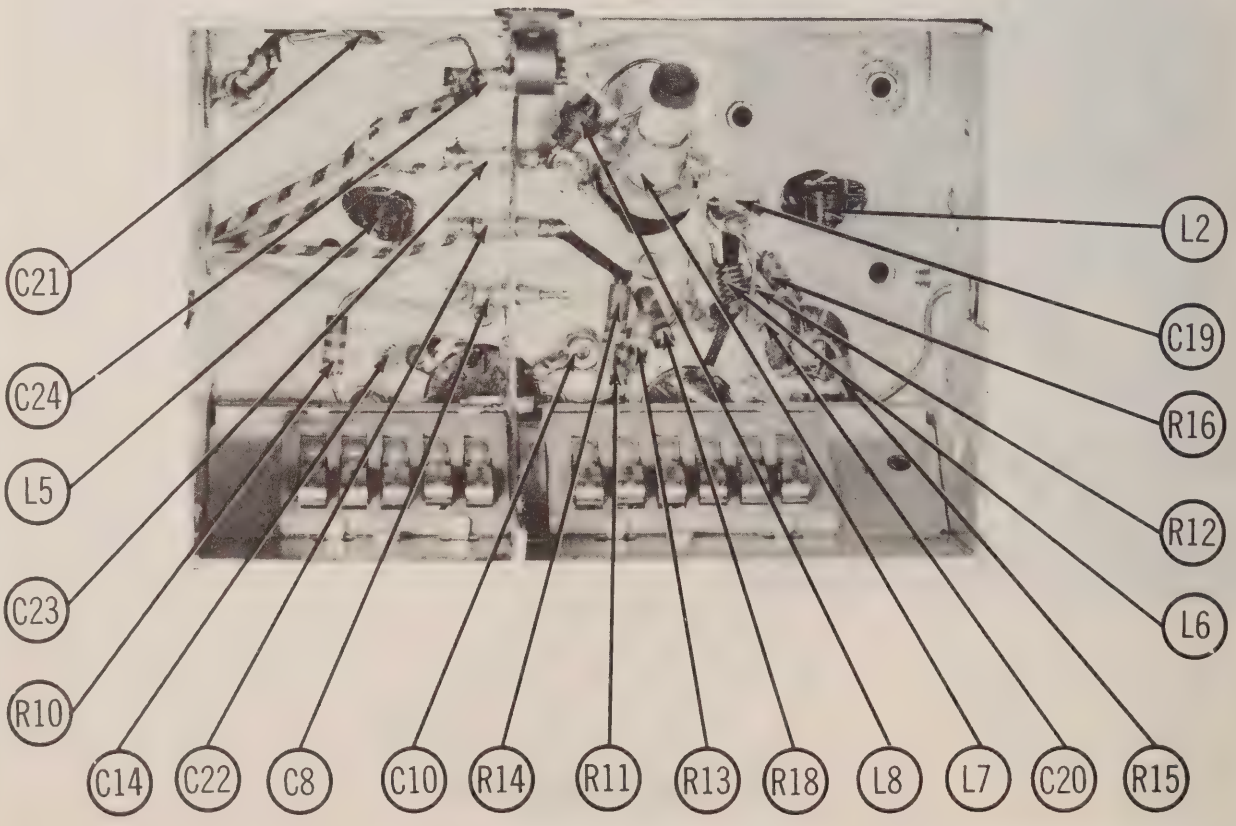
† MEASURED FROM PIN 8 OF V18
# MEASURED FROM PIN 3 OF V16
■ MEASURED FROM 115V LINE



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

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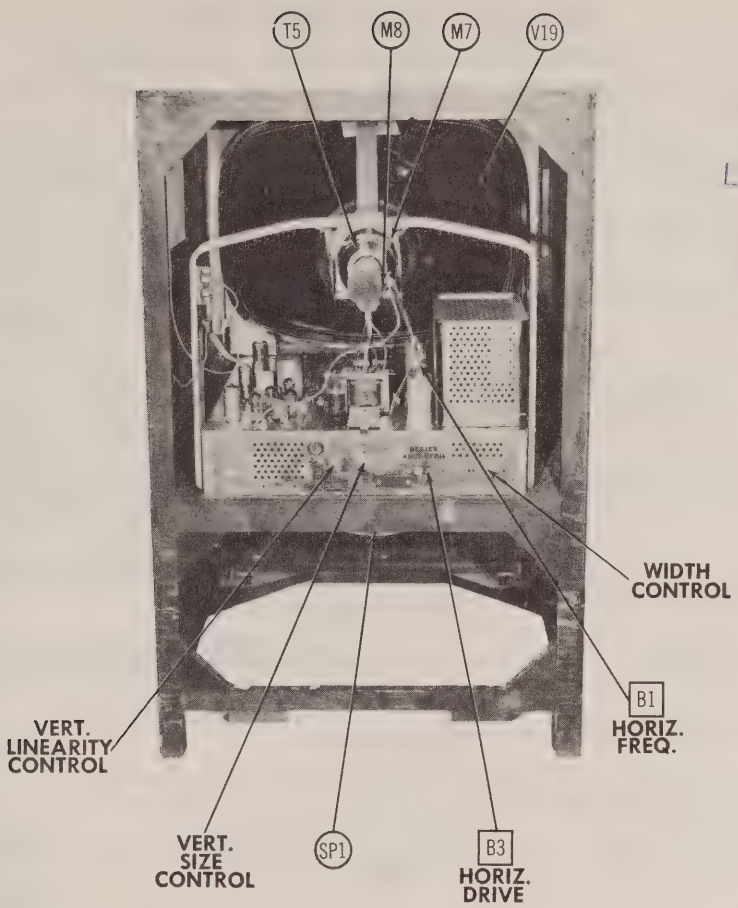
L. F. KLANKENSHIP
[illegible] MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

The following adjustments are for receivers that do not include the letter "Q" in the series designation on the rear of the chassis:

1. Set the horizontal hold control fully counter clockwise.
2. Adjust the horizontal frequency slug (B1) fully counter clockwise then in a clockwise direction until the picture is just ready to pull into sync.
3. With horizontal hold control near its mid-range position, picture should hold sync while switching off channel and back again. At the extreme settings of the horizontal hold control the picture should lose sync when switching off channel and back again.
4. If the horizontal circuit does not respond as in step 3, adjust the horizontal drive trimmer (B3) counter clockwise as far as possible. without the presence of vertical white lines or compression near the center of the picture.
5. Repeat steps 1, 2 and 3. If picture still fails to sync properly continue with step 6.
6. Adjust B1 and B2 to their maximum counter clockwise positions.
7. Short together terminals "C" and "D" of L20 and set horizontal hold control fully counter clockwise.
8. Adjust B1 until picture just locks in horizontally. Remove short from terminal "C" to "D" of L20. If picture loses sync, adjust B2 clockwise until picture syncs.
9. Connect the vertical amplifier of an oscilloscope to terminal "C" of L20. Connect low side to chassis. Adjust B2 for wave form shown in Fig. 7. If necessary, simultaneously adjust the horizontal hold control to keep the picture in sync while adjusting B2.
10. With horizontal hold control set to its maximum counter clockwise position, adjust B1 until locks in and does not lose sync when switching off channel and back again then turn B1 slowly counter clockwise until picture just begins to lose sync. Check for circuit stability as in step 3.

Adjust the width control for a picture slightly wider than necessary to fill the picture mask horizontally.

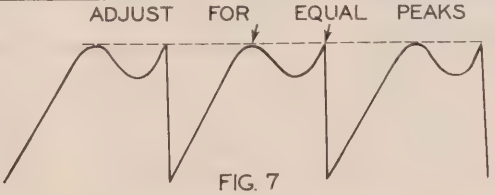


FIG. 7

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V14, V15, V16 and V18. Check adjustment of the width control and B3. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check C82, C85, C86, R98, R99, T3, T5A and other associated components.	Check C77, C78, C79, C80, L20, R93, R113 and other associated circuit components.

DRIVE LINES

Check by substitution V14, V15 and V16. Check adjustment of the horizontal drive (B3). Check C79, C80, C81, C85, C86, T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check by substitution V14, V15 and V16. Check horizontal output and damper circuit components especially T3 and T5A for failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15 and V16. Check associated circuit components.

XMAS TREE EFFECT

Substitute V14. Check L20, C77, C78, C79, C80 and other associated components for failure or change of value.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R75, R8 and other associated circuit components.	Check C64, C92, R72, R74, R76 and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check C3B, T4, T5B and other associated components for failure or change of value.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check associated circuit components especially C92 and R74.

FOLDS

Check by substitution V12 and V13. Check associated circuit components, including T4 and T5B for failure or change of value.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Check by substitution V11 and V12. Check components associated with V11 and V12A, especially C59 and C61.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V11 and V12. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check components associated with V12B.	Check components associated with V11 and V12A especially C62.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Substitute V14. Check associated components especially C77, C78, C79, C80, L20 and R90.

HORIZONTAL BENDING

Substitute V14 and V15. Check circuit near these stages for filament lead dress shorts. Check C75 and C76.

VIDEO

LOSS OF VIDEO

Check C42, R38, picture tube and other associated circuit components.

SOUND BARS (4.5MC BEAT)

Check tuner fine tuning adjustment. Check 4.5MC trap adjustment, A8. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check video detector crystal and assembly. Check picture tube and other associated circuit components.

NEGATIVE PIX

Check by substitution V6 and V7. Check video detector assembly. Check AGC network components. Check picture tube and other associated components.

SMEAR

Substitute V6. Check video detector assembly. Check C42, R34, R36, R37, R38, L16, L17, picture tube and other associated circuit components for failure or change of value.

WIDE BLACK BAR ACROSS PIX

Check V1, V2, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9 and V10. Check stages V9B and V10 using audio signal generator. Apply audio signal across R53.

If Satisfactory	If Unsatisfactory
Check audio IF and ratio detector alignment and components.	Check components associated with V9B and V10 especially C55.

BUZZ

Adjust fine tuning for best sound and picture. Adjust A7 for minimum buzz. If still objectionable substitute V9 and realign audio IF and ratio detector stages.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Silvertone PART No.	STANDARD REPLACEMENT		
V1A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BQ7	6BQ7	9AJ	
C	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	AGC Keying	6AU6	6AU6	7BK	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector - AF Amplifier	6T8	6T8	9E	
V10	Audio Output	6AQ5	6AQ5	7BZ	
V11	Sync Separator	6BE6	6BE6	7CH	
V12A	Sync Amplifier - Vert. Oscillator	12AU7	12AU7	9A	
B	Sync Amplifier - Vert. Oscillator	12AT7	12AT7	9A	
V13	Vert. Output	6AH4GT	6AH4GT	8EL	
V14	Horiz. AFC - Horiz. Oscillator	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Silvertone PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	21MP4	21MP4	21MP4	21MP4	21MP4	12M	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	450	508072	AFH3-44		CO35		FP377	TVL-3787	
B	▲40	450								
C	■40	450								
C2	40	300	160095	PRS450/40		BR4035		TC78	TVA-1611	
C3A	▲80	250	509002	AFH3-142		C109		FP375	TVL-3722	
B	▲100	50								
C4	4	450	504719	PRS450/4		BR445		TC70	TVA-1702	
C5	4	450	504719	PRS450/4		BR445		TC70	TVA-1702	
C6	10	150	505174	PRS150/12		BR1015		TC42	TVA-1402	
C7	3-9		509064		829-10					
C8	800			EF-001	MFT-1000				503C-D1	
C9	3.6		520721							
C10	.5-3		507968		829-3			CT565A		
C11	47		520719	BPD-000047	D6-470	G033	GP1K-470	UC-5447	5GA-Q47	
C12	1.5		520720	SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C13	800			EF-001	MFT-1000				503C-D1	
C14	1000		520735	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C15	100			BPD-0001	D6-101	G042	GP1K-101	UC-531	5GA-T1	
C16	.5-3		507968		829-3			CT565A		
C17	10		520718	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1	
C18	5		520717							
C19	6.8		520716	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C20	1000		520735	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C21	120		513029	BPD-00012	D6-121	G044	GP2K-121	UC-5312	5GA-T12	
C22	800			EF-001	MFT-1000				503C-D1	
C23	800			EF-001	MFT-1000				503C-D1	
C24	800			EF-001	MFT-1000				503C-D1	
C25	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C26	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C27	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C28	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C29	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C30	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C31	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C32	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C33	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C34	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C35	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C36	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C37	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C38	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C39	5		513432	SI5NP0	TCZ-4.7	Z011	NP0K-050	ZT-555	5TCCB-V47	
C40	.22	200	512238	P488-22		CUB2P22		PT4025	4TM-P22	
C41	47		513438	SI47NP0	TCZ-47	Z033	NP0K-470	ZT-5447	5TCC-Q47	
C42	.1	200	512216	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C43	220	1000	513032	HVD15-00022		VT22			10GA-T22	
C44	.47	200	512239	P288-47		CUB2P47		PT405	2TM-P47	
C45	2.2		513001	SI2.2NP0	TCZ-2.2	Z006	NP0K-2R2		5TCCB-V22	
C46	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C47	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C48	1500		513010	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C49	1500		513010	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C50	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C51	.047	200	512235	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C52	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C53	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C54	270		513006	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C55	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C56	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C57	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C58	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	

(CONT'D ON NEXT PAGE)

PROPERTY OF
L. F. [illegible]NKEN
[illegible] E. 8TH ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C59	.047	400	512235	P488-047	DF-503	CUB6547		PT6147	47M-S47	
C60	.47	200	512239	P288-47		CUB23P47		PT405	2TM-P47	
C61	.01	400	512206	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	47M-S1	
C62A	.01							PT611		
B	.002		•508062	† BPD-01	† DD-103	† K082	† 811-01	PT622	† 5HK-S1	
C	.005			PA-110	† PC-100	115TM1	† 1405-01	PT635	† 10JC1	
D	.005							PT635		
C63	4700	1000	512533			1R5D47				
C64	.047	400	512236	P488-047		CUB4547		PT4147	47M-S47	
C65	.033	200		P688-033		PM4S33				Note 1
C66	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	Note 1
C67	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C68	.047	400	512235	P488-047	DF-503	CUB4547		PT4147	47M-S47	
C69	100	500	512502	1469-0001		32R5T1		MCB235	MS-31	
C70	.0032	400	512232	P488-0032	D6-232	CUB6D22	GP2-333-232	PT6222	47M-D32	
C71	47	1000	513030	HVD15-000047		VQ47			10GA-Q47	Note 2
C72	47	1000	513030	HVD15-000047		VQ47			10GA-Q47	
C73	.047	400	512236	P488-047	DF-503	CUB4647		PT4147	47M-S47	
C74	.047	200	512235	P488-047	DF-503	CUB2S47		PT4147	47M-S47	
C75	.022	400	512233	P488-022		CUB4S22		PT4122	47M-S22	
C76	.47	200	512239	P288-47		CUB2P47		PT405	2TM-P47	
C77	200		513437							
C78	.01	400	512206			SR5T82				
C79	820	500	512547			TP53	GP2L-102	UC-531	5HK-D1	
C80	1000		513009	SM1000	D6-102	TM3	N750L-371			
C81	270				TCN-270			PT601	6TM-P1	
C82	.1	600	512218	P688-1	DF-104	CUB6P1		PT4025	4TM-P22	
C83	.22	200	512238	P488-22		CUB2P22		MCB335	MS-31	
C84	100	500		1468-0001		22R5T1		PT6147	6TM-S47	
C85	.047	600	512237	P688-047		CUB6S47		PT6122	6TM-S22	
C86	.022	600	512234	P688-022		CUB6S22		PT4147	47M-S47	
C87	.047	200	512235	P488-047		CUB2S47		RV20035A	20DK-T5	
C88	500	20000	530990	HV20C	TV3-503	MMU2075	413-501		20GA-Q56	
C89	56	1500	513027					PT611	6TM-S1	Note 1
C90	.01	600	512206	6892X-01		CUB6S1		PT601	6TM-S1	Note 1
C91	.01	600	512206	6892X-01		CUB6P1		PT601	6TM-P1	
C92	.1	600	512218	P688-1	DF-104					

Note 1. Not used in all Models.
Note 2. Some Models use a 10-160MMF variable capacitor in this application (part #520991).
This unit is part of a dual trimmer assembly.
* Items C61A, C61B, C61C, C61D, R70A, R70B, R70C are combined in one unit.
† To replace original unit, install 10000MMF unit in series with C-R unit input lead.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Silvertone PART No.	IRC PART No	CLAROSTAT PART No	CENTRALAB PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	300Ω	½	521388	* QJ-547			UF32	Contrast Panel
B	1Meg	½	Not Req.				UR16-T25	Volume rear tapped at 220K
C	Switch		Not Req.				U8-26	Attach to R1A
R2A	50KΩ	½	521059	Q11-123	AG-44-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	1Meg	½	521058	Q11-137	AG-61-S	AB-69	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	100KΩ	½	509893	Q11-128	AG-49-S	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	RS-3/16	AK-4	Not Req.	Attach to R4A
R5A	500KΩ	½	530681	Q11-133	AG-58-S	AB-59	U-50	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	400Ω	4	529996	4WK-400	A10-400	SVP-391	M400P	Width wire wound
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R6A
R7A	2.5Meg	½	530944	Q11-239	AG-64-S	AB-83	SU-565	Vert. Size
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	5000Ω	½	530945	Q11-16	AG-19-S	AB-13	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Silvertone PART No.	IRC PART No.	NOTES
R9	15KΩ	½	510157	BTS-15K	
R10	47KΩ	½	510167	BTS-47K	
R11	100KΩ	½	510172	BTS-100K	
R12	160KΩ	5% ½	510774	BTS-160K 5%	
R13	100KΩ	5% ½	510751	BTS-100K 5%	
R14	1500Ω	½	510139	BTS-1500	
R15	10KΩ	½	510154	BTS-10K	
R16	220KΩ	½	510179	BTS-220K	
R17	10KΩ	½	510154	BTS-10K	
R18	15KΩ	½		BTS-15K	
R19	4700Ω	2	510348	BTB-4700	
R20	100Ω	½	510118	BTS-100	
R21	10KΩ	½	410154	BTS-10K	
R22	68Ω	½	510116	BTS-68	
R23	4700Ω	½	510130	BTS-470	
R24	100KΩ	½	510172	BTS-100K	
R25	120KΩ	½	510174	BTS-120K	
R26	680Ω	½	510151	BTS-680	
R27	5600Ω	½	510150	BTS-5600	
R28	47Ω	½	510112	BTS-47	
R29	5600Ω	½		BTS-5600	Note 1
R30	100Ω	½	510118	BTS-100	
R31	100Ω	½	510118	BTS-100	
R32	100Ω	½	510118	BTS-100	
R33	47KΩ	½	510166	BTS-47K	
R34	8200Ω	½	510153	BTS-8200	
R35	12KΩ	5% ½		BTS-12K 5%	Note 1
R36	2200Ω	1		BTA-2200	Note 2
R37	470KΩ	½		BTS-470K	Note 3
R38	560KΩ	½		BTS-560K	Note 4
R39	100KΩ	½	510172	BTS-100K	

ITEM No.	RATING OHMS	RATING WATT	Silvertone PART No.	IRC PART No	NOTES
R40	100KΩ	½	510172	BTS-100K	Note 5
R41	22KΩ	½	510160	BTS-22K	Note 6
R42	33KΩ	½	510163	BTS-33K	
R43	100KΩ	½	510172	BTS-100K	
R44	100KΩ	½	510172	BTS-100K	
R45	3.3Meg	½	510701	BTS-3.3Meg	
R46	1800Ω	½		BTS-1800	Note 7
R47	82Ω	½		BTS-82	
R48	4700Ω	½	510249	BTA-4700	
R49	220Ω	½	510124	BTS-220	
R50	18KΩ	½	510159	BTS-18K	
R51	68KΩ	½	510169	BTS-68K	
R52	220Ω	½	510124	BTS-220	
R53	10Meg	½	510187	BTS-10Meg	
R54	470KΩ	½	510184	BTS-470K	
R55	22KΩ	½	510160	BTS-22K	
R56	560KΩ	5% ½	510778	BTS-560K 5%	
R57	820KΩ	5% ½	510747	BTS-820K 5%	
R58	18KΩ	½	510159	BTS-18K	
R59	2.2Meg	½	510193	BTS-2.2Meg	
R60	1.5Meg	½		BTS-1.5Meg	Note 8
R61	82KΩ	½	510171	BTS-82K	
R62	220KΩ	½	510178	BTS-220K	
R63	47KΩ	½	510166	BTS-47K	Note 3
R64	22KΩ	½		BTS-22K	Note 9
R65	10Meg	½		BTS-10Meg	Note 10
R66	22KΩ	½		BTS-22K	Note 3
R67	4700Ω	½		BTS-4700	Note 11
R68	4700Ω	½		BTS-4700	Note 3
R69	18KΩ	½	510159	BTS-18K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	Silvertone PART No.	IRC PART No	NOTES
R70A	22KΩ	½		BTS-22K	
B	8200Ω	½	* 508062	BTS-8200	
C	8200Ω	½		BTS-8200	
R71	1.3Meg 5%	½	510777	BTS-1.2Meg 5%	
R72	470KΩ	½	510184	BTS-470K	
R73	8200Ω	½	510163	BTS-8200	
R74	2.2Meg	½	510193	BTS-2.2Meg	
R75	390Ω	½	510129	BTS-390	
R76	330KΩ	½	510181	BTS-330K	
R77	47KΩ	½		BTS-47K	Note 3
R78	560Ω	½	510132	BTS-560	
R79	560Ω	½	510132	BTS-560	
R80	330KΩ	½	510181	BTS-330K	
R81	820KΩ	½	510189	BTS-820K	
R82	100KΩ	½	510172	BTS-100K	
R83	330KΩ	½	510181	BTA-330K	
R84	4700Ω	½	510148	BTS-4700	
R85	220KΩ	½		BTS-220K	Note 12
R86	1Meg	½		BTS-1Meg	Note 13
R87	150KΩ	½		BTS-150K	Note 3
R88	68KΩ	½	510169	BTS-68K	
R89	120KΩ	½	510174	BTS-120K	
R90	150KΩ	½	510175	BTS-150K	

ITEM No.	RATING OHMS	RATING WATT	Silvertone PART No.	IRC PART No	NOTES
R91	10KΩ	½	510154	BTS-10K	
R92	10KΩ	½	510154	BTS-10K	Note 3
R93	470KΩ	½	510184	BTS-470K	
R94	100Ω	2	510318		
R95	150KΩ	½		BTS-150K	Note 3
R96	56KΩ	½		BTS-56K	Note 3
R97	1Meg	½		BTS-1Meg	Note 3
R98	47KΩ	½	510166	BTS-47K	
R99	12KΩ	2	510356	BTB-12K	
R100	680Ω	½	510134	BTS-680	
R101	3.3Ω	3	510725		
R102	1Meg	½	510190	BTS-1Meg	
R103	150KΩ	½	510175	BTS-150K	
R104	100KΩ	2	510172	BTS-100K	
R105	50Ω	5	510782	1 3/4A-50	
R106	600Ω	10	510741	1 3/4A-600	
R107	1500Ω	½	510181	BTS-1500	
R108	15KΩ	1	510357	BTS-15K	
R109	400Ω	10	510779	1 3/4A-400	
R110	390Ω	½	510129	BTS-390	
R111	5600Ω			BTS-5600	
R112	230KΩ	½		BTS-230K	
R113	68KΩ	1		BTA-68K	

* Items R70A, R70B, R70C C61A, C61B, C61C, C61D are combined in one unit.
Note 1. Some models may use a 15KΩ resistor in this application.
Note 2. Some models may use a 3900Ω resistor in this application.
Note 3. Not used in all models.
Note 4. Some models may use a 100KΩ resistor in this application.
Note 5. Some models may use a 470KΩ resistor in this application.
Note 6. Some models may use a 470KΩ or a 330KΩ or no resistor in this application.
Note 7. Some models may use a 1500Ω resistor in this application.
Note 8. Some models may use a 820KΩ resistor in this application.
Note 9. Some models may use a 18KΩ resistor in this application.
Note 10. Some models may use a 1Meg resistor in this application.
Note 11. Some models may use a 6800Ω resistor in this application.
Note 12. Some models may use a 150KΩ resistor in this application.
Note 13. Some models may use a 330KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC. 1	RATING SEC. 2	Silvertone PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ⑥1.54A	650VCT .100ADC	5VAC ⑥3A	529961						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑥3.3A	12.6VCT ⑥3.4A								

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	Silvertone PART No.	STANCOR PART No	MERIT PART No	Halldorson PART No	TRIAD PART No.	RCA TYPE No	NOTES
T2	160Ω	980Ω	520980	A-8125	A-3003	B6702	A-97X	209T1⑤	Vert.Osc. Trans.
T3	431.8Ω tap①	0Ω	521066		HVO-9① ④	FB41①④	D-18①	233T1⑤	Horiz.Output Trans.
	2.8Ω,								
	5.6Ω,								
	17.1Ω,								
	19.8Ω,								
	36.8Ω								
T4	760Ω tap ⑧		520975 ④	A-8123 ⑤	A-3037⑤	Z1804⑤	A-102X⑤	222T1⑤	Vert.Output Trans.
	9Ω								
T5A	20Ω		520942	DY-9A⑦⑥	MDF-72⑦	DF802⑦	Y-17⑦③	211D2⑦③	Horiz. Defl. Coils
B	48Ω		521267⑥		⑥	⑥			Vert.Defl. Coils

① Drill new mounting holes.
② Connect original terminal #7 to new terminal #9, original #6 to new #7, original #5 to new #5, original #3 to new "T", original #2 to new #3, original #1 to new #1.
③ Connect terminal #7 to terminal #8, then connect original terminal #7 to new terminal #9, original #6 to new #7 and #8, original #5 to new #5, original #3 to new "T", original #2 to new #3, original #1 to new #1.
④ Includes terminal strip and connectors for deflection yoke leadspart #521095).
⑤ Drill one new mounting hole.
⑥ Yoke cover and positioning device.
⑦ Use original yoke cover and positioning device.
⑧ Remove C89 from yoke terminal strip on top of vertical output transformers.
⑨ Connect original terminal #7 to new terminal #9, original #6 to new #8, original #5 to new #5, original #3 to new #4, original #2 to new "T" or #3, original #1 to new #1. If insufficient width, connect a .005MMF 600V capacitor across terminals "T" and #3.
⑩ Connect terminal #2 to terminal #3, then connect original terminal #7 to new terminal #10, original #6 to new #8, and original #5 to new #6. Original #3 to new #5, original #2 to new #2 and #3, original #1 to new #1.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Silvertone PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T6	5.1KΩ	3.9Ω	509376	A-3877	A-3930	S-2X	Z1107	24S51	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	Silvertone PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6"X 9"	PM	3.9Ω	508174	ST-810 Mod P69-V	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Silvertone PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1A	Ant. Coil	00CT	0Ω	520702				Channel 2
B	Ant. Coil	00CT	0Ω	520703				Channel 3
C	Ant. Coil	00CT	0Ω	520704				Channel 4
D	Ant. Coil	00CT	0Ω	520705				Channel 5
E	Ant. Coil	00CT	0Ω	520706				Channel 6
F	Ant. Coil	00CT	0Ω	520707				Channel 7
G	Ant. Coil	00CT	0Ω	520708				Channel 8
H	Ant. Coil	00CT	0Ω	520709				Channel 9
I	Ant. Coil	00CT	0Ω	520710				Channel 10
J	Ant. Coil	00CT	0Ω	520711				Channel 11
K	Ant. Coil	00CT	0Ω	520712				Channel 12
L	Ant. Coil	00CT	0Ω	520713				Channel 13
L2	Fil. Choke	0Ω		520518				
L3	Neutr. Coil	0Ω		520701				
L4A	RF, Mixer grid & osc. coils	0Ω		520722				Channel 2
B	RF, Mixer grid & osc. coils	0Ω		520723				Channel 3
C	RF, Mixer grid & osc. coils	0Ω		520724				Channel 4
D	RF, Mixer grid & osc. coils	0Ω		520725				Channel 5
E	RF, Mixer grid & osc. coils	0Ω		520726				Channel 6
F	RF, Mixer grid & osc. coils	0Ω		520727				Channel 7
G	RF, Mixer grid & osc. coils	0Ω		520728				Channel 8
H	RF, Mixer grid & osc. coils	0Ω		520729				Channel 9
I	RF, Mixer grid & osc. coils	0Ω		520730				Channel 10
J	RF, Mixer grid & osc. coils	0Ω		520731				Channel 11
K	RF, Mixer grid & osc. coils	0Ω		520732				Channel 12
L	RF, Mixer grid & osc. coils	0Ω		520733				Channel 13
L5	Fil. Choke	0Ω		530520				
L6	RF Choke	0Ω		520714				
L7	1st Video IF	.9Ω		520734				Includes core, core Part # 509062
L8	RF Choke	1Ω		520715				
L9	2nd Video IF	.3Ω	.5Ω	520977	17-1063	TV-116	6249	Less slug; slug Part # 507357
L10	3rd Video IF	.3Ω	.5Ω	520977	17-1064	TV-116	6250	Less slug; slug Part # 507357
L11	Fil. Choke	0Ω		507584	19-3001	TV-189	6175	6 Microhenry
L12	4th Video IF	.6Ω	.7Ω	520979	17-1064	TV-116	6250	Less slug; slug Part # 507357
L13	Series Peak. Coil	7Ω		520620	19-3180	TV-184	6180	180 Microhenries
L14	Shunt. Peak. Coil	19Ω		520985	19-3660		4650	650 Microhenries
L15	4.5MC trap	1.7Ω		509603	20-1004	TV-151	1470	Truetone Part # Includes C41 & slug; slug Part # 507357
L16	Series Peak. Coil	9.5Ω		530689	19-3180	TV-184	6180	180 Microhenries; Note 1
L17	Shunt. Peak. Coil	15Ω		509342	19-1923	TV-188	4648	394 Microhenries; Note 2
L18	Sound IF	1Ω		509378			1470-A	
L19	Ratio Det.	3.8Ω	.8OCT	509706	17-3493	TV-115	1498	Tertiary winding-.5Ω
L20	Horiz. Osc.	75Ω		520943	20-1402 *	TV-162 *	6183 *	Includes core; core part # 521064
								Pri. tapped @ 52Ω
								Horiz. wave form winding-46Ω

Note 1. Some models may use Truetone Part # 520984 in this application.
Note 2. Some models may use Truetone Part # 520986 in this application.
* Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE 10 CURRENT 1000 (~)	Silvertone PART No	Stancor PART No	Merit PART No	Triad PART No.	Halldorson PART No	Thordarson PART No
L21	.190ADC	69Ω	3.36 Hy.	508341	C-2325		C-21X①	C5030	26C43①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	Silvertone PART No. FUSE	Silvertone PART No. HOLDER	LITTELFUSE PART No FUSE	LITTELFUSE PART No HOLDER	BUSS PART No FUSE	BUSS PART No HOLDER
M1	3AG S/B	4A 125V	520988	520989	313004, (3AG S/B-4A)	357002	MDX4	4408
M2	3AG	1/4A 250V	508713	520989	312.250 (3AG-1/4A)	357002	AGC 1/4	4408

SILVERTONE
MODELS 3177A, 3187A (Ch. 100.400)

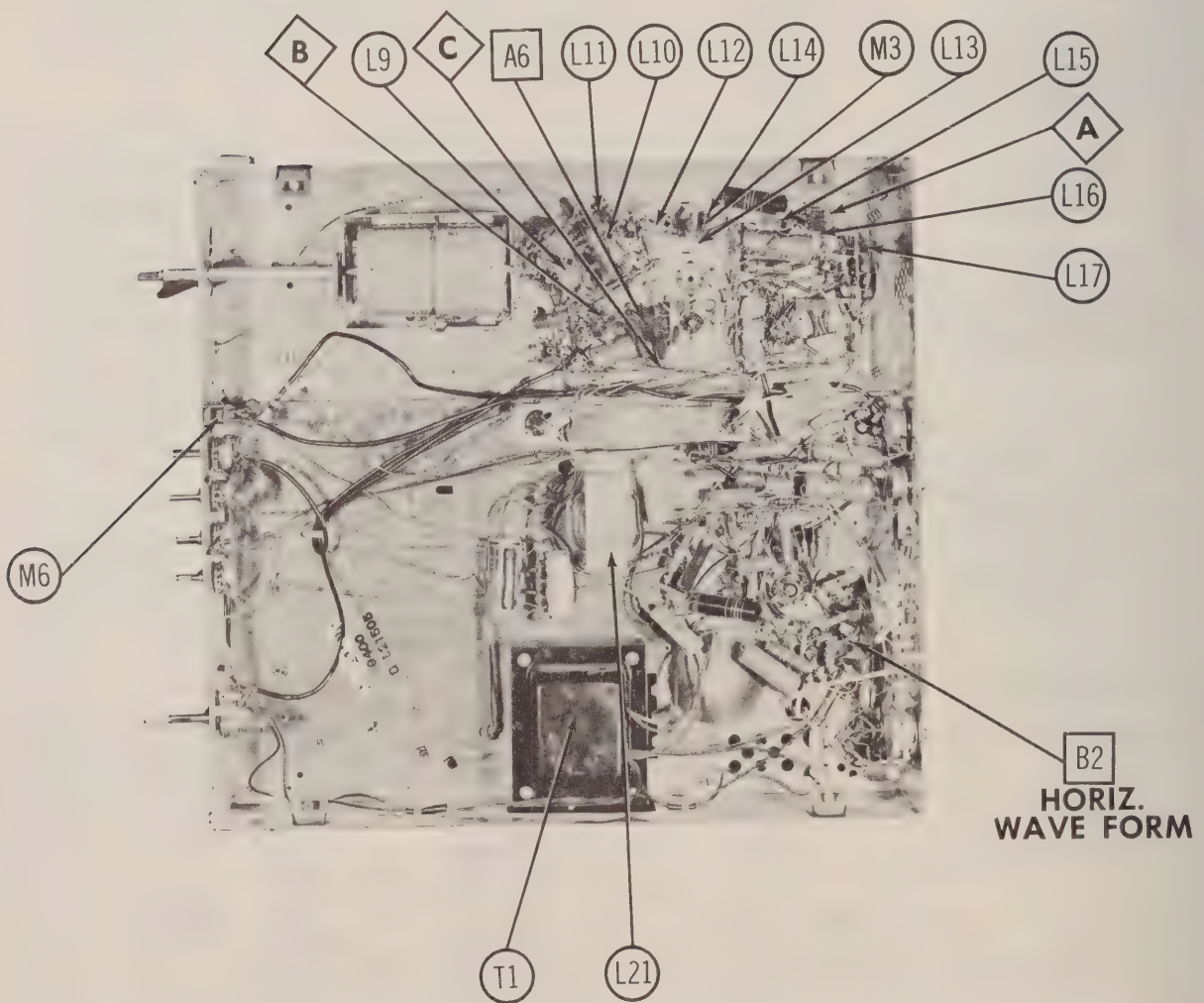
PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Silvertone PART No.	SYLVANIA PART No.	FEDERAL PART No.	
M3	1N64	509386	1N132	1N64A	Video detector

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M4	Dial light	118921	# 47 bayonet
M5	Tuner	521287	
M6	Switch	520563	TV-phono DPST slide
M7	Centering magnet	521267	Includes rear yoke cover
M8	Ion trap	521183	
	Terminal strip	521095	Deflection yoke connections (mounts on M4)
	Connector	521184	Filament cap & lead for 1B3GT HV. rectifier
B3	Trimmer cap	520991	Dual 10-160MMF horiz. range & horiz. drive adjust.
	Cabinet	521404	
	Safety glass	520937	
	Knob	520836-A	Channel selector
	Knob	520837-A	Fine tuning
	Knob	520838-A	Off-on volume
	Knob	520839-A	Picture contrast
	Mask	521102-A	Kinescope



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check fuse, M1, AC interlock assembly, switch on volume control and T1. If filaments light, substitute V18. Check B+ filter and decoupling components.

SMALL AND/OR DIM PIX

Substitute V18. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M2. Check by substitution V14, V15, V16 and V17. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check R101, R102, C82, C88, R98, R99, T3, T5A and other associated components.	Check C77, C78, C79, C80, L20, R93, R113 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V14, V15, V16, V17 and V18. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V14, V15, V16, V17 and V18. Check R101, R102, C82, C88, R98, R99, T3, T5A, picture tube and other associated circuit components for failure or change of value.

GENERAL

RASTER SOUND NO PIX

Follow procedure outlined under "Loss of Video".

RASTER NO SOUND NO PIX

Check by substitution V1, V2, V3, V4, V5 and V6. Check video detector assembly. Check components associated with the video IF strip.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing. Check video signal for interference pulses.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustment are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

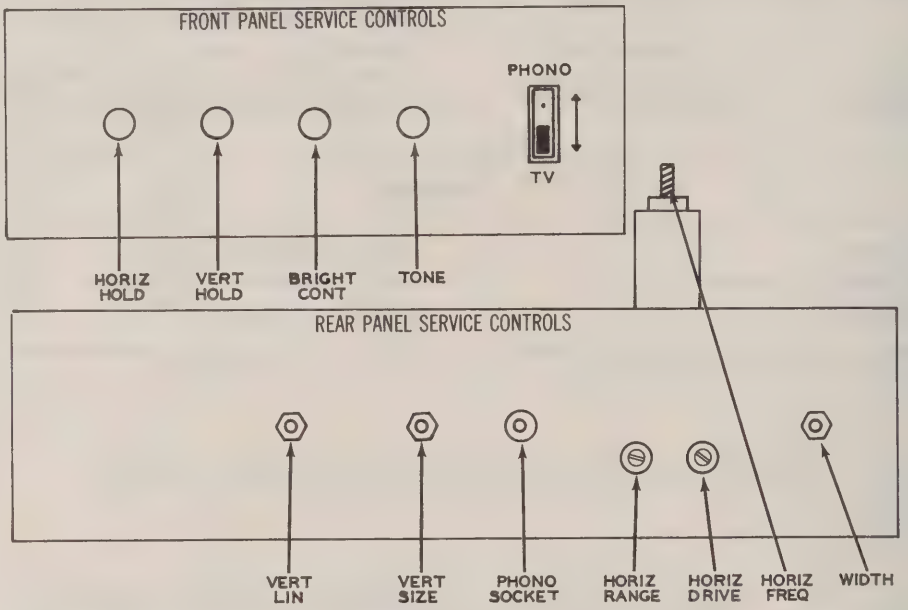
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove three wood screws holding wood strip at the top of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L2) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L19) located on top of chassis. (See tube placement chart).

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location, see tube placement chart).

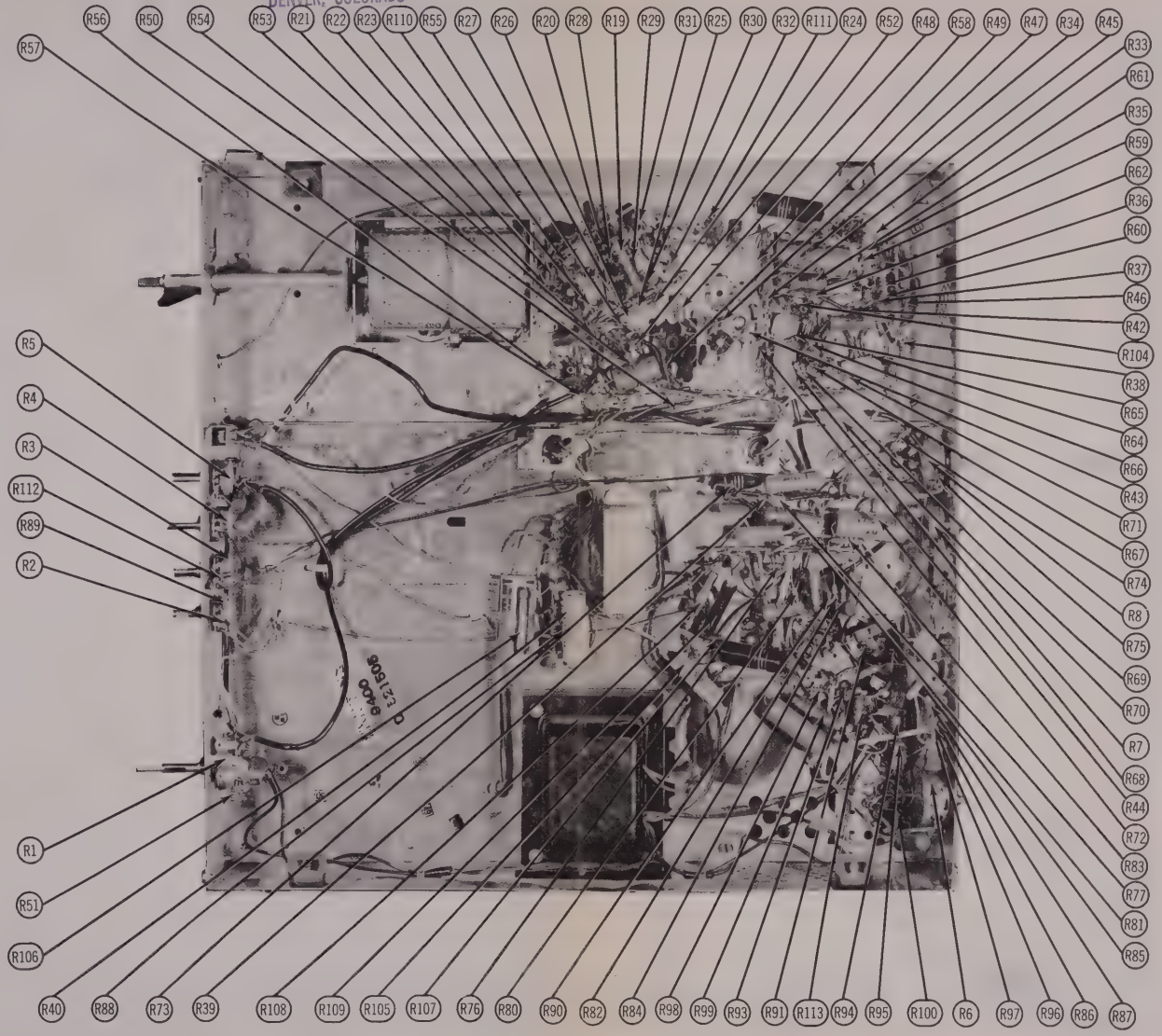
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

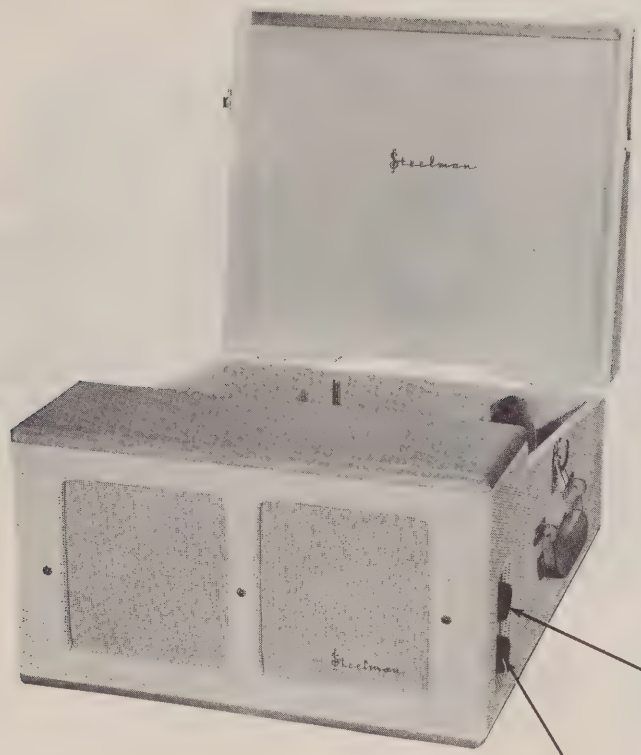
1. Remove 4 push on type control knobs from front panel.
2. Disconnect built-in antenna.
3. Remove 7 wood and 1 metal screws. Remove rear cover.
4. Disconnect speaker plug.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

L. F. L
3924 TEJON ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

STEELMAN
MODEL 3A5



L. F. [illegible]
[illegible] ST.
DENVER, COLORADO

STEELMAN
MODEL 3A5

TRADE NAME	Steelman Model 3A5
MANUFACTURER	Steelman Radio & Phono Co., Inc., 12-30 Anderson Ave., Mt. Vernon, N.Y.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Three)	Types 12AU6 AF Amp., 50L6GT Audio Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .24 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT- SEE V-M MODEL 950 - PHOTOFACT SET 107, FOLDER 13 OR RECORD CHANGER MANUAL CM-3.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: STEELMAN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amplifier	12AU6	12AU6	7BX	
V2	Output	50L6GT	50L6GT	7S	
V3	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: STEELMAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	40	150		PRS150/80-40-20		BBRD8415		3N538	TVA-3455	Yellow
B	80	150				BR2015				Red
C	20	150								Blue
C2	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C3	5000			BPD-005	DD-502		811-005	DC-525	5HK-D5	
C4	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C5	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C6	100			S1100	D6-101		GP1K-101	UC-531	5GA-T1	
C7	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C8	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C9	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C10	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: STEELMAN PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	3 Meg	1/2	VC1					Volume tapped at 260K
R2A	100KΩ	1/2	VC2	Q11-128	A47-100K-S	AB-40	U-41	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

RESISTORS

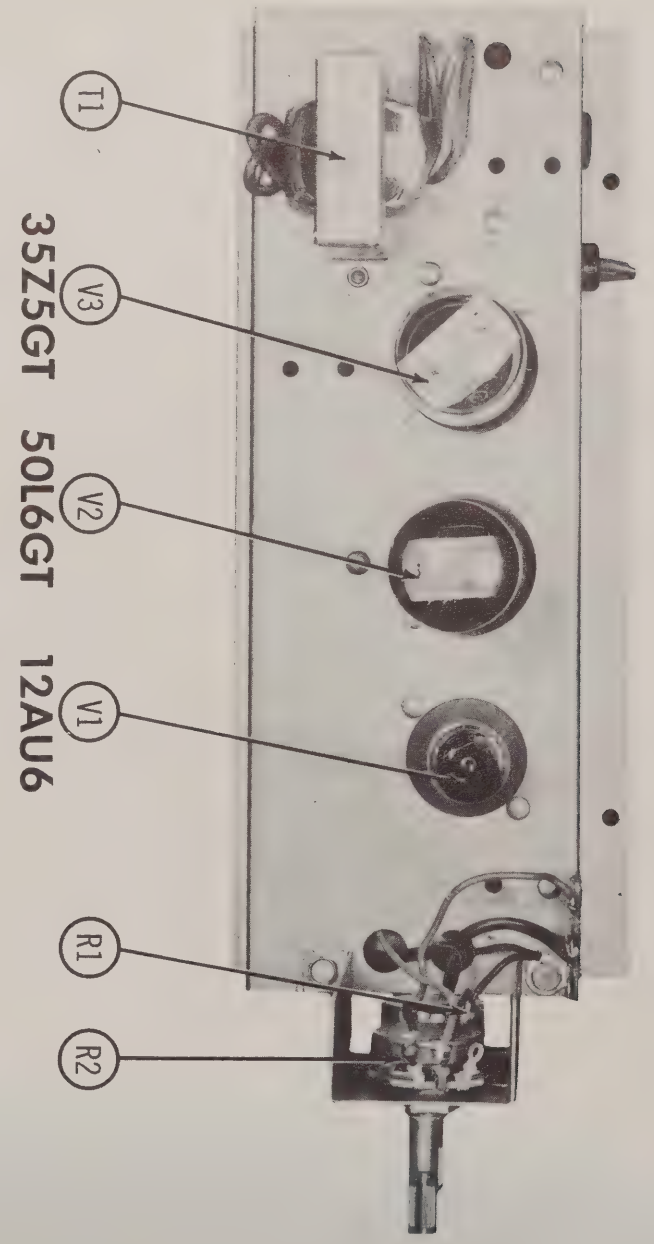
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: STEELMAN PART No.	IRC PART No.	NOTES
R3	47KΩ	1/2		BTS-47K	
R4	2.2Meg	1/2		BTS-2.2Meg	
R5	3300Ω	1/2		BTS-3300	
R6	1 Meg	1/2		BTS-1 Meg	
R7	220KΩ	1/2		BTS-220K	
R8	470KΩ	1/2		BTS-470K	
R9	150Ω	1		BTA-150	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: STEELMAN PART No.	IRC PART No.	NOTES
R10	2200Ω	1		BTA-2200	
R11	330Ω	2		BTB-330	
R12	22Ω	2			
R13	125Ω	10		1 3/4A-125	
R14	600Ω	10		1 3/4A-600	
R15	10KΩ	1/2		BTS-10K	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: STEELMAN PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	1.9KΩ	1.6Ω						TS-24S60	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	STEELMAN PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5"	PM	3.2Ω		ST-105 Mod P5-X	5A1	Speakers used in parallel
SP2	5"	PM	3.2Ω		ST-105 Mod P5-X	5A1	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	STEELMAN PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1						43	0-2 S-2	

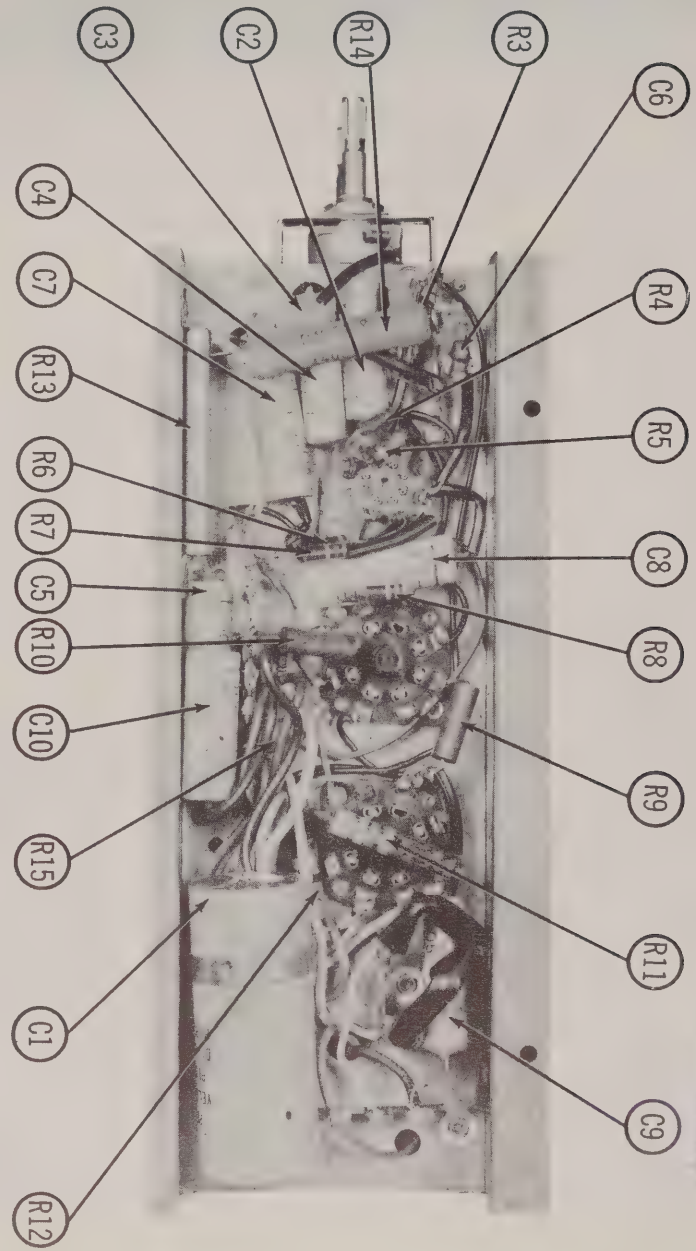
ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	STEELMAN PART No.	WALCO PART No.	JENSEN PART No.	
M2		W-75TPS	S-66	

CHASSIS—BOTTOM VIEW



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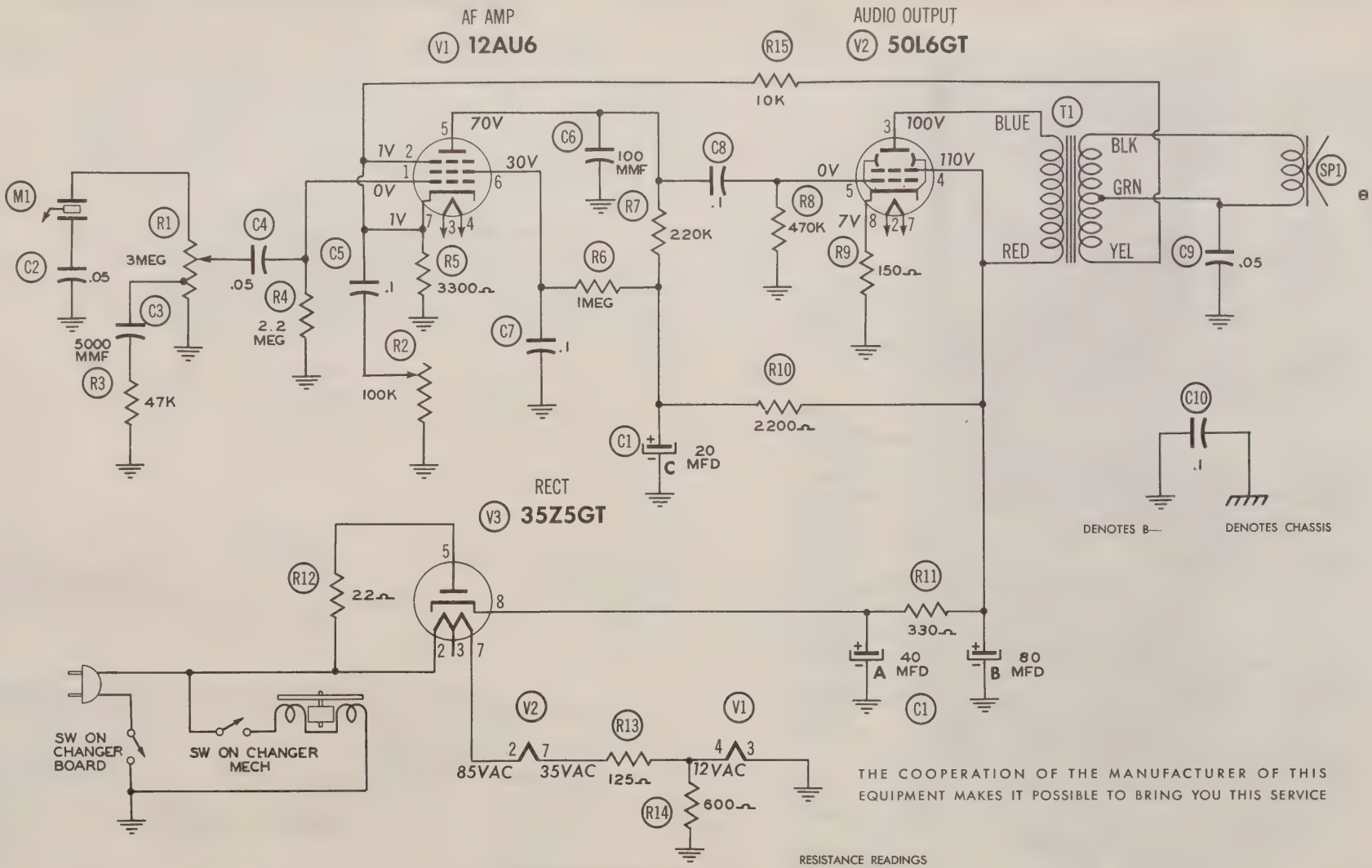
STEELMAN MODEL 3A5



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RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12AU6	2.2Meg	3.3KΩ	0Ω	14Ω	†220KΩ	†1Meg	3.3KΩ	
V 2	50L6GT	INF	220Ω	†500Ω	†330Ω	470KΩ	0Ω	150Ω	150Ω
V 3	35Z5GT	INF	270Ω	250Ω	†330Ω	280Ω	0Ω	220Ω	150KΩ

† MEASURED FROM PIN 8 OF V3

ϴ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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244-11

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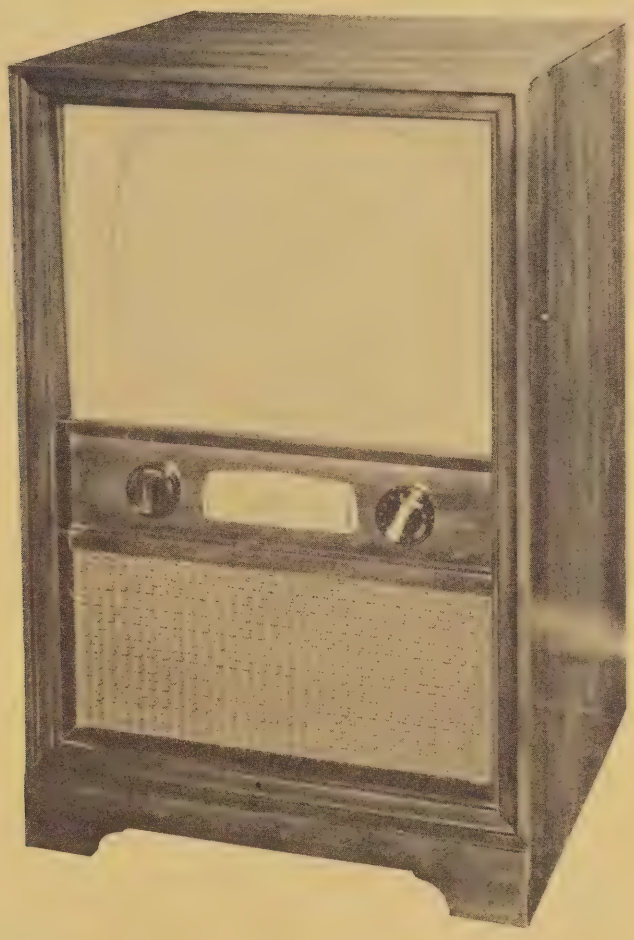

MODEL 2D1353A

TRUETONE
MODEL 2D1353A (Series A thru M)

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MODEL 2D1353A (Series A thru M)

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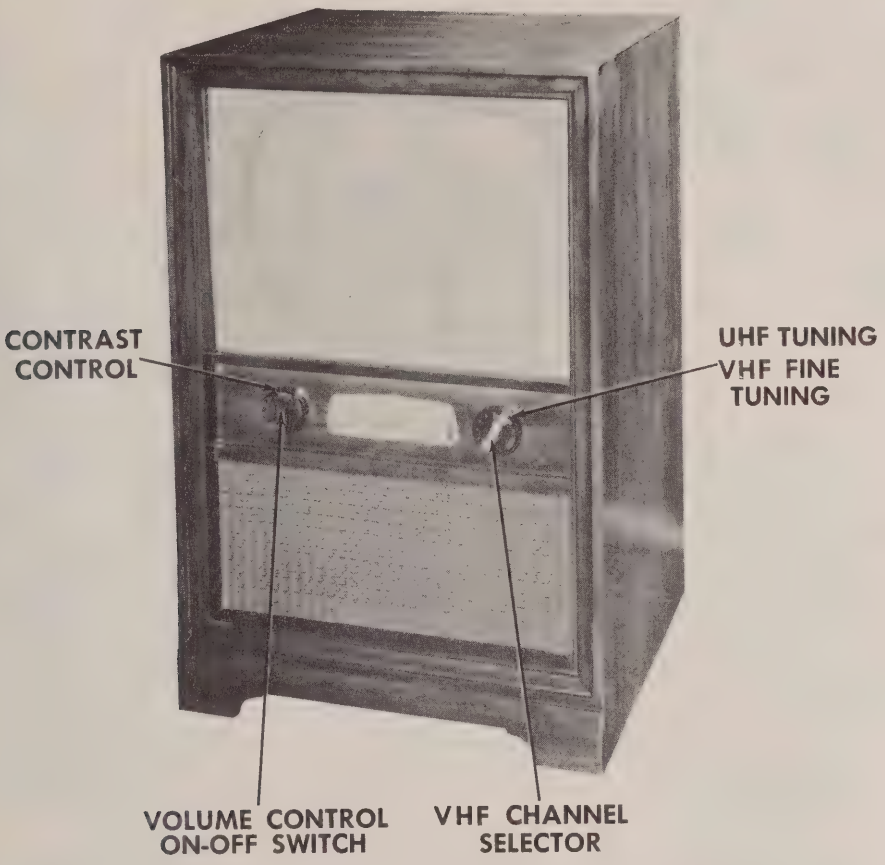

TRUETONE
MODEL 2D1353A (Series A thru M)

TRADE NAME	Truetone Model 2D1353A (Series A thru M)
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Television Receiver
TUBES	Twenty

POWER SUPPLY 110- 120 Volts AC-60 Cycles RATING 1.75 Amp. @ 117 Volts AC
TUNING RANGE-Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 45.75MC, Sound IF 41.25MC (Interarrier)

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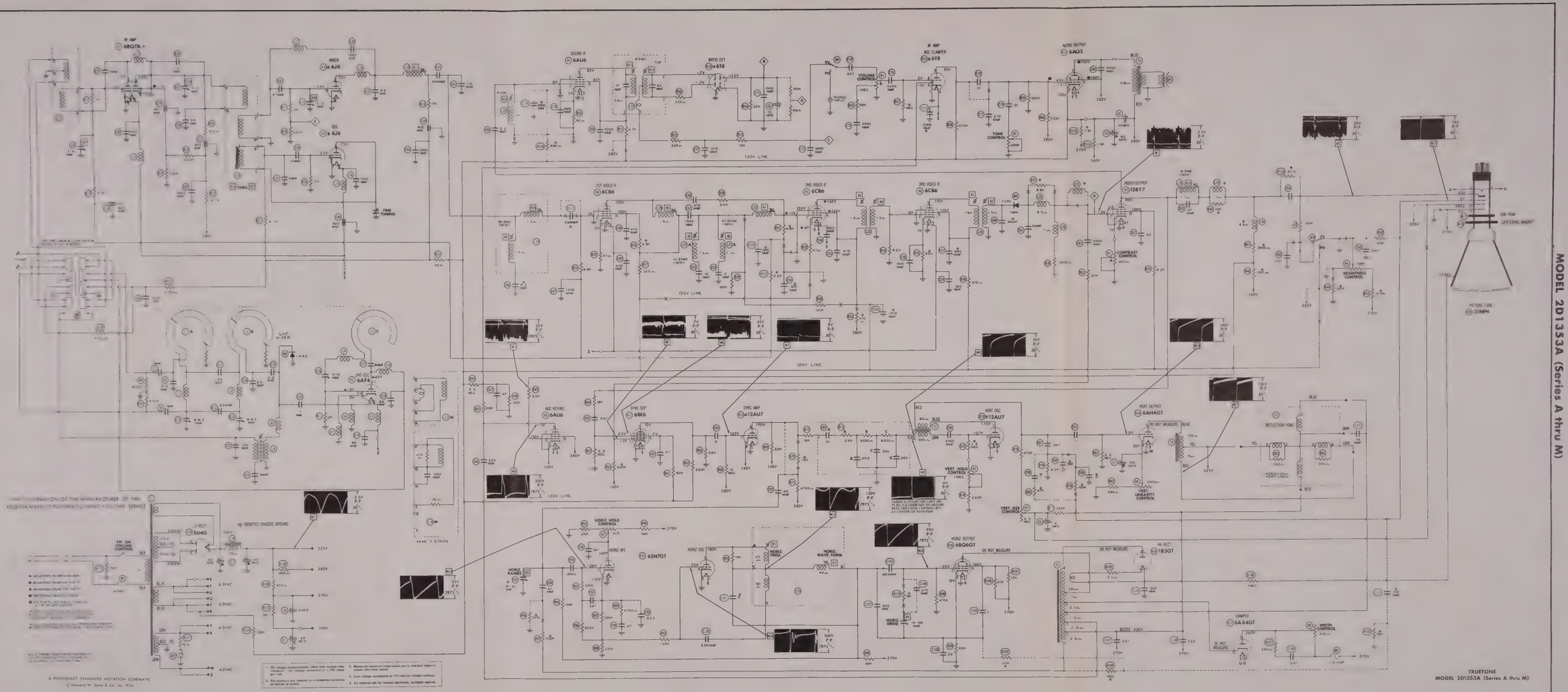
TRUETONE
MODEL 2D1353A (Series A thru M)
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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DENOTES CHASSIS GROUND
SW. ON VOLUME CONTROL
RF AMP 6BQ7A
MIXER 6J6
OSC 6J6
FINE TUNING
VHF AFC
UHF AFC
LINE OSC 6AF4
44 MC I. F. STRIPS
SOUND IF 6AU6
RATIO DET 6T8
AF AMP AGC CLAMPER 6T8
AUDIO OUTPUT 6AQ5
VOLUME CONTROL
TONE CONTROL
1ST VIDEO IF 6CB6
2ND VIDEO IF 6CB6
3RD VIDEO IF 6CB6
VIDEO OUTPUT 12BY7
CONTRAST CONTROL
BRIGHTNESS CONTROL
PICTURE TUBE 21MP4
ION TRAP
CENTERING MAGNET
AGC KEYING 6AU6
SYNC SEP 6BE6
SYNC AMP 12AU7
VERT OSC 12AU7
VERT HOLD CONTROL
VERT. SIZE CONTROL
VERT. LINEARITY CONTROL
VERT OUTPUT 6AH4GT
DEFLECTION YOKE
HORIZ HOLD CONTROL
HORIZ AFC 6SN7GT
HORIZ OSC
HORIZ FREQ.
HORIZ. WAVE FORM
HORIZ OUTPUT 6BQ6GT
HORIZ DRIVE
HV RECT 1B3GT
DAMPER 6AX4GT
WIDTH CONTROL
BOOST 430V
V RECT 5U4G
120V LINE
135V LINE
DO NOT MEASURE
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction as indicated at socket.
3. Resistance values are in ohms unless otherwise stated.
4. Line voltage maintained at 125 volts for voltage readings.
5. All controls set for normal operation, no signal applied.

CHASSIS TOP VIEW

TRUETONE
MODEL 2D1353A (Series A thru M)

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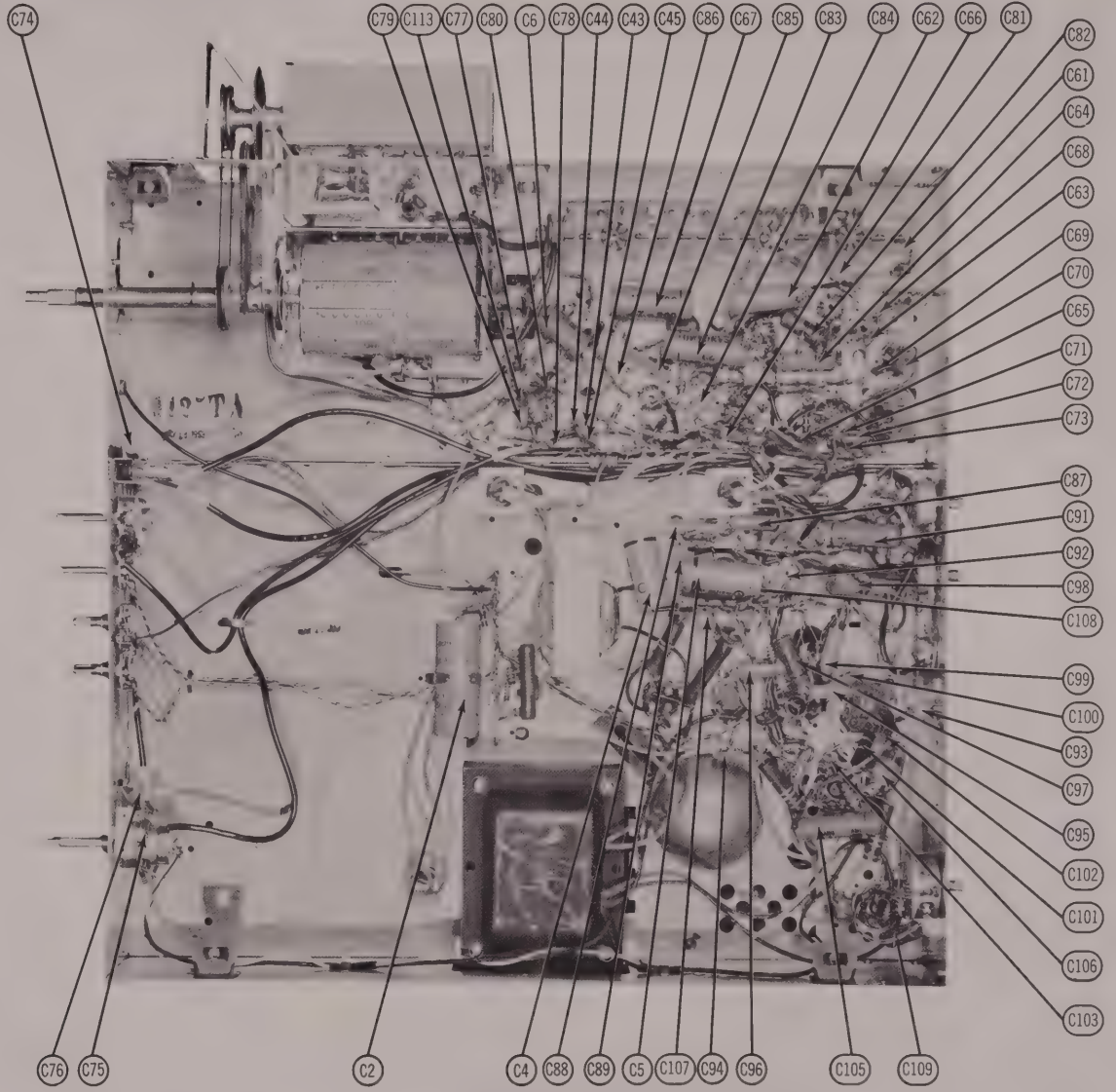

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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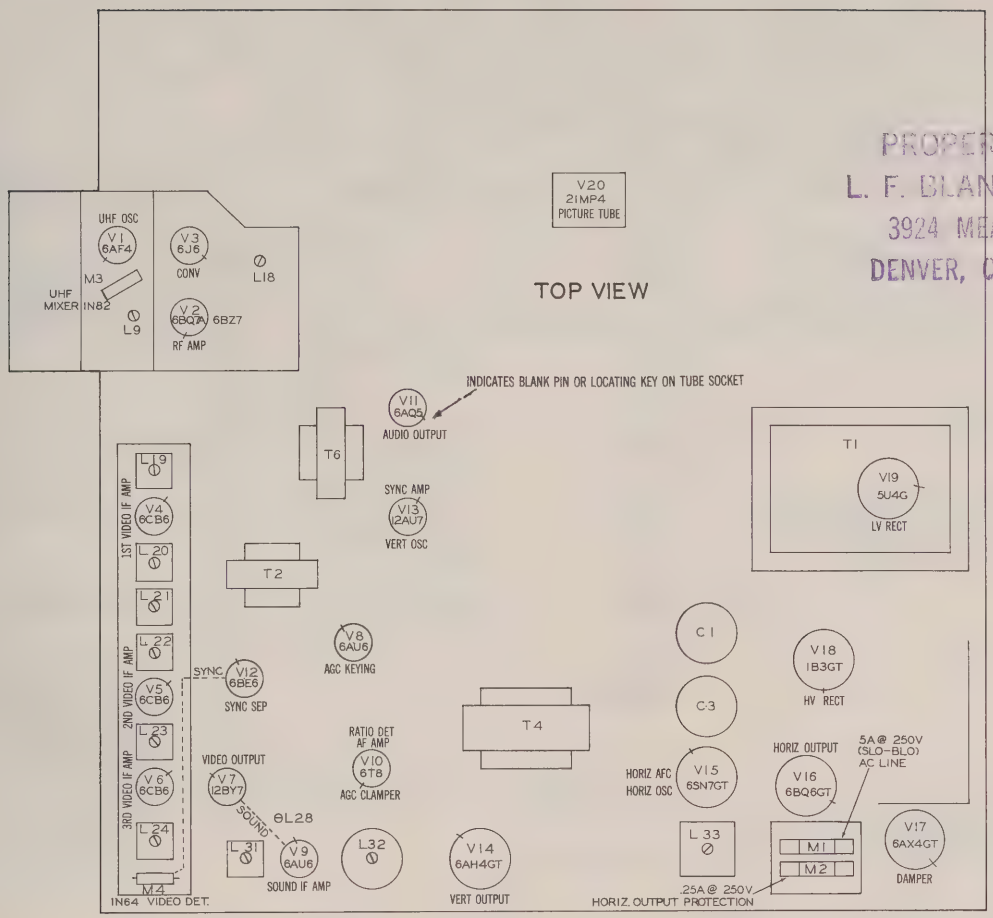
TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V9, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V20
Has pic, no sound - V9, V10, V11
Overloaded picture - V8, V10

SYNC FAILURE
No vert. sync - V13
No horiz. sync - V13, V15
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M2)
No vertical deflection - V13, V14
Poor vert. linearity or foldover - V13, V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19
Vert. off freq. - V13
Horiz. off freq. - V13, V15

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube to disable the high voltage.

VIDEO IF ALIGNMENT

The local oscillator may be disabled by placing a piece of transparent cellulose tape on the first two contacts (from front of drum assembly) of any channel strip and then switching the tuner to the unsulated strip. Disabling the local oscillator reduces the posibility of erroneous indications. The local oscillator may also be disabled by removing any oscillator channel strip and switching tuner to that channel. The antenna terminals should be shorted with a jumper wire. Use only enough sweep generator output to obtain useable pattern on scope. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 6CB6 (V6). Low side to chassis.	43.5MC (10MC Swp)	42MC 45MC	Any	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A1, A2	Detune 2nd. IF transformer by connecting an alligator clip to pin 5 (plate) of 6CB6 (V5). Adjust for response similar to Fig.1. Remove alligator clip from pin 5 of V5.
2.	"	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis.	"	42MC 43.5MC 44.9MC	"	"	A3, A4	Connect the negative lead of a 3 volt bias battery to the ungrounded side of C67. Connect positive lead to chassis. Adjust for response similar to Fig. 2.
3.	"	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis.	Not used	41.25MC (Unmod)	"	Use VTVM. DC probe thru 10KΩ to point (A). Common to chassis.	A5	Disconnect bias battery. Adjust for MINIMUM deflection.
4.	"	"	"	47.25MC	"	"	A6	"
5.	"	"	43.5MC (10MC Swp)	42.5MC 44.5MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A7, A8	Reconnect bias battery as in step 2. Adjust for response similar to Fig. 3.
6.	Direct	High side to ungrounded tube shield floating over converter tube (V3). Low side to chassis.	Not used	39.75MC (Unmod)	"	Use VTVM. DC probe thru 10KΩ to point (A). Common to chassis.	A9	Disconnect bias battery. Adjust for MINIMUM deflection.
7.	"	"	44MC (10MC Swp)	42.5MC 44.5MC	"	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A10, A11	Reconnect bias battery as in step 2. Adjust for response similar to Fig. 4.
8.	"	"	"	39.75MC 41.25MC 45.75MC 47.25MC	"	"		Check for response curve similar to Fig.5. If necessary, retouch A1 thru A4, A7, A8, A10 and A11 to obtain desired response. To observe the 39.75 and 47.25MC markers disconnect the bias battery, increase scope gain and sweep generator output. If necessary, repeat steps 4 and 6.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors in alignment point (D) as shown on the schematic.
Set the contrast control fully counter clockwise.
Remove any video IF amplifier tube (V4, V5 or V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC Probe thru 10KΩ point (B). Common to chassis.	A12, A13	Adjust for maximum deflection.
10.	"	"	"	"	DC Probe thru 10KΩ to point (C). Common to point (D).	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. For final adjustment of A14 restore set to normal operating condition and tune in a TV station. Adjust A14 for MINIMUM buzz and clearest sound.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.
Set contrast control fully counter clockwise.
Remove any video IF amplifier tube (V4, V5, for V6) from its socket.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A12, A13	Disconnect stabilizing capacitor C6. Adjust for curve of maximum amplitude and symmetry similar to Fig. 6.
10.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point (C). Low side to chassis.	A14	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 7. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines. For final adjustment of A14 restore set to normal operating condition and tune in a TV station. Adjust A14 for MINIMUM buzz and clearest sound.

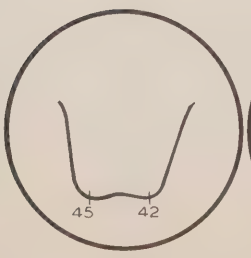

FIG.1

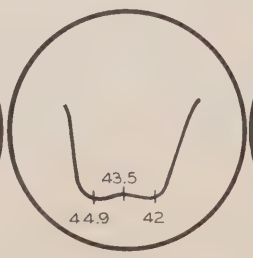

FIG.2

FIG.3

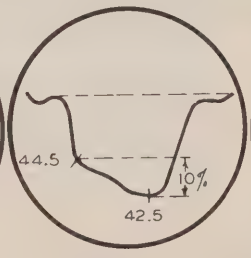

FIG.4

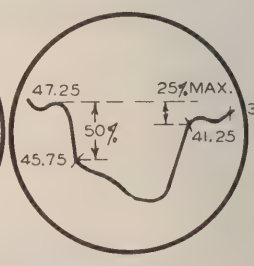

FIG.5

ALIGNMENT INSTRUCTIONS (cont)

4.5 MC TRAP ALIGNMENT

Set contrast control fully counter clockwise. Remove any video IF amplifier tube (V4, V5 or V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC Probe thru detector (Fig. 8) to pin 11. (cathode) of picture tube. Common to chassis.	A15	Adjust for minimum deflection. Replace the video IF amplifier (V4, V5 or V6) in its socket.

OSCILLATOR ALIGNMENT

The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the bias supply as in step 2 of "Video IF alignment". Remove the insulating tape (or replace channel strip) placed over the two terminals on the channel strip.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig. 9. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

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RF AND MIXER ALIGNMENT

Connect the bias supply as in step 2 of "Video IF alignment".
Connect .001MFD capacitor across the vertical amplifier input terminals of scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to tuner chassis.	A28, A29, A30	Adjust for response curve similar to Fig. 10 with markers above 90%.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13			Check for response curve similar to Fig. 10. If markers fall below 70% on any channel make compromise adjustments of A28, A29 and A30 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

The UHF tuner has been properly aligned at the factory and is very stable. It this portion of the receiver should ever require alignment or major repair the entire unit should be disconnected and returned to the factory.

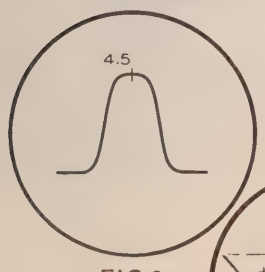


FIG.6

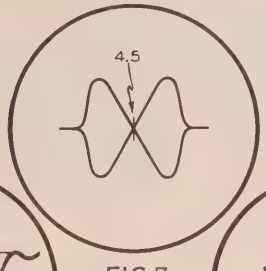


FIG.7

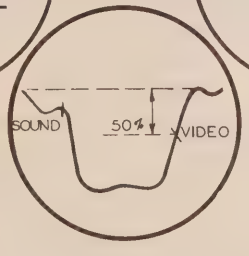


FIG.9

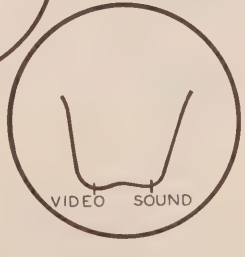


FIG.10

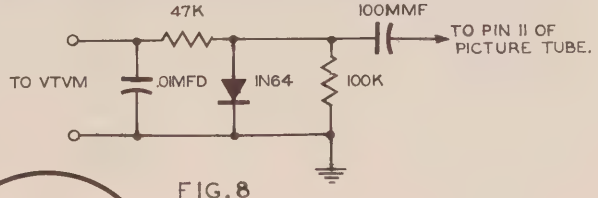
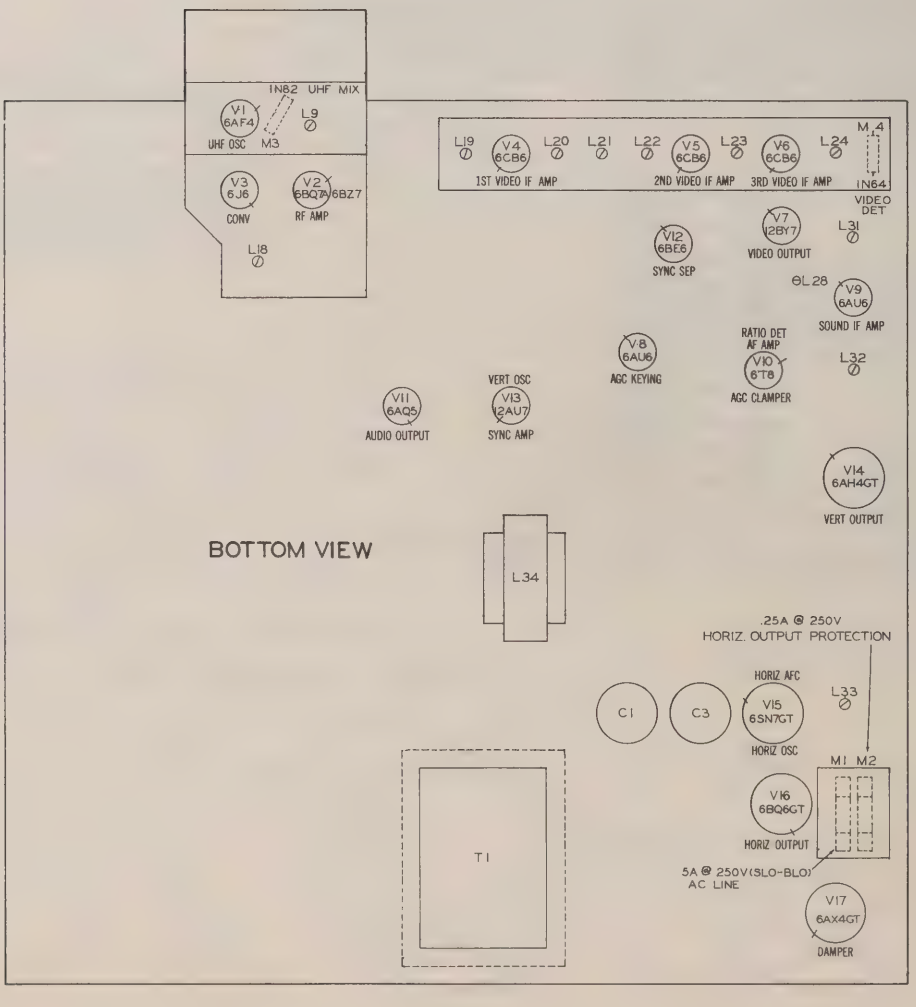


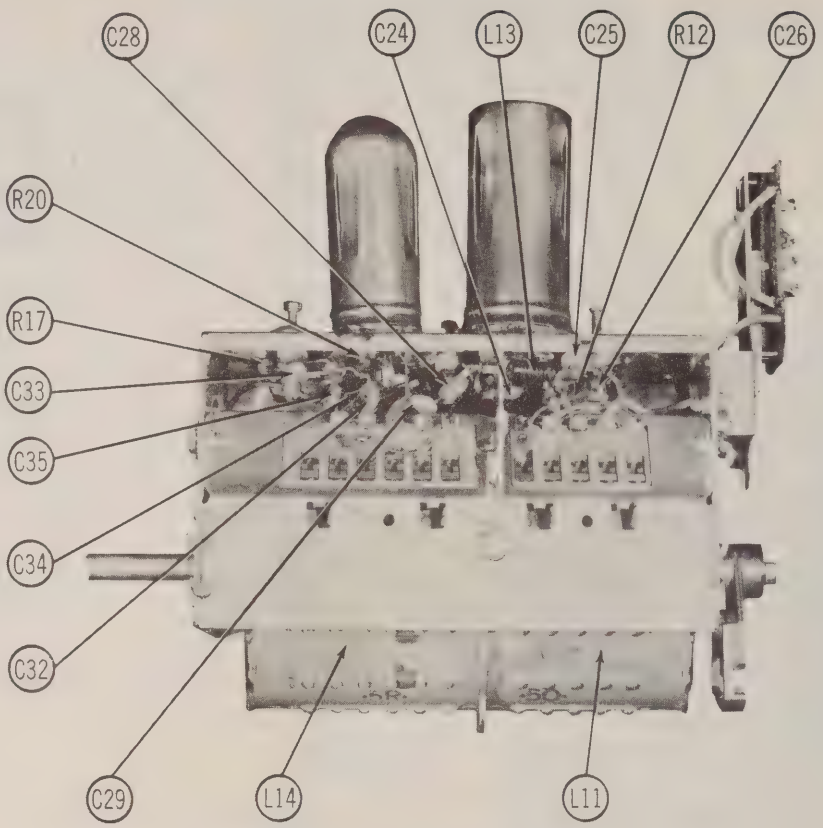
FIG.8

RESISTANCE MEASUREMENTS

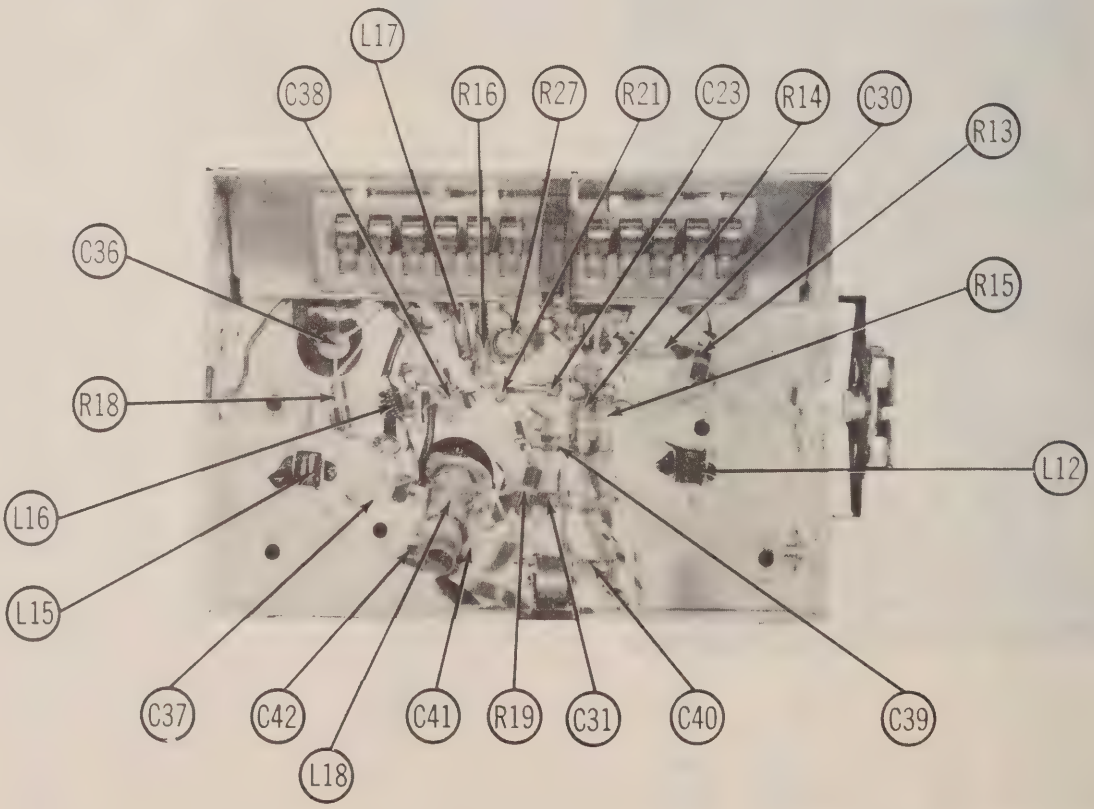
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	▲■ 2. 8KΩ	12KΩ	0Ω	. 2Ω	0Ω	12KΩ	▲■2. 8KΩ		
V 2	6BQ7A	INF	150KΩ	0Ω	. 1Ω	0Ω	† 5. 9KΩ	160KΩ	INF	0Ω
V 3	6J6	▲4. 8KΩ	▲15KΩ	. 1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 4	6CB6	107KΩ	47Ω	0Ω	. 1Ω	♦1. 2KΩ	♦8KΩ	0Ω		
V 5	6CB6	♦6. 8KΩ	♦47Ω	▲ 100K	▲ 100K	† 1. 2KΩ	† 1. 2KΩ	70KΩ		
V 6	6CB6	1. 3Ω	82Ω	. 1Ω	0Ω	▲ 470Ω	▲ 470Ω	0Ω		
V 7	12BY7	150Ω	5. 6KΩ	150Ω	. 1Ω	. 1Ω	0Ω	† 20KΩ	▲ 8. 2KΩ	150Ω
V 8	6AU6	† 50KΩ	† 15. 5KΩ	▲ 100KΩ	▲ 100KΩ	200KΩ	† 670Ω	† 15. 5KΩ		
V 9	6AU6	1Ω	0Ω	. 1Ω	0Ω	▲ 4. 7KΩ	▲ 4. 7K Ω	82Ω		
V 10	6T8	INF	22KΩ	INF	. 1Ω	0Ω	100KΩ	0Ω	10 Meg	▲ 470KΩ
V 11	6AQ5	360KΩ	† 11. 5K	▲ 100KΩ	▲ 100KΩ	† 1KΩ	† 670Ω	360KΩ		
V 12	6BE6	† 835KΩ	0Ω	. 1Ω	0Ω	22KΩ	▲ 82KΩ	2. 2Meg		
V 13	12AU7	◓ 1. 9Meg	2. 2Meg	0Ω	0Ω	0Ω	† 38KΩ	† 10 Meg	†15. 5KΩ	. 1Ω
V 14	6AH4GT	2. 2 Meg	0Ω	▲ 100KΩ	2. 2 Meg	† 820Ω	▲ 100KΩ	. 1Ω	2K	
V 15	6SN7GT	1. 5Meg	† 90KΩ	430KΩ	480KΩ	† 70KΩ	0Ω	. 1Ω	0Ω	
V 16	6BQ6GT	† 470Ω	. 1Ω	480KΩ	† 10. 5KΩ	470KΩ	† 70KΩ	0Ω	100Ω	TOP CAP ◓ 17Ω
V 17	6AX4GT	INF	† 1. 3KΩ	10 Meg	† 75Ω	† 650Ω	† 470Ω	▲ 100KΩ	▲ 100KΩ	
V 18	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ◓ 412 Ω
V 19	5U4G	INF	17KΩ	INF	25Ω	INF	25Ω	INF	17KΩ	
V 20	21MP4	▲ 100KΩ	108KΩ	PIN 6 0Ω	PIN 10 ◓ 330KΩ	PIN 11 † 140KΩ	PIN 12 ▲ 100KΩ			

■ MEASURED IN UHF POSITION.
† MEASURED FROM PIN 8 OF V19.
♦ MEASURED FROM PIN 7 OF V5.
▲ MEASURED FROM 120V line.
◓ MEASURED FROM PIN 3 OF V17.

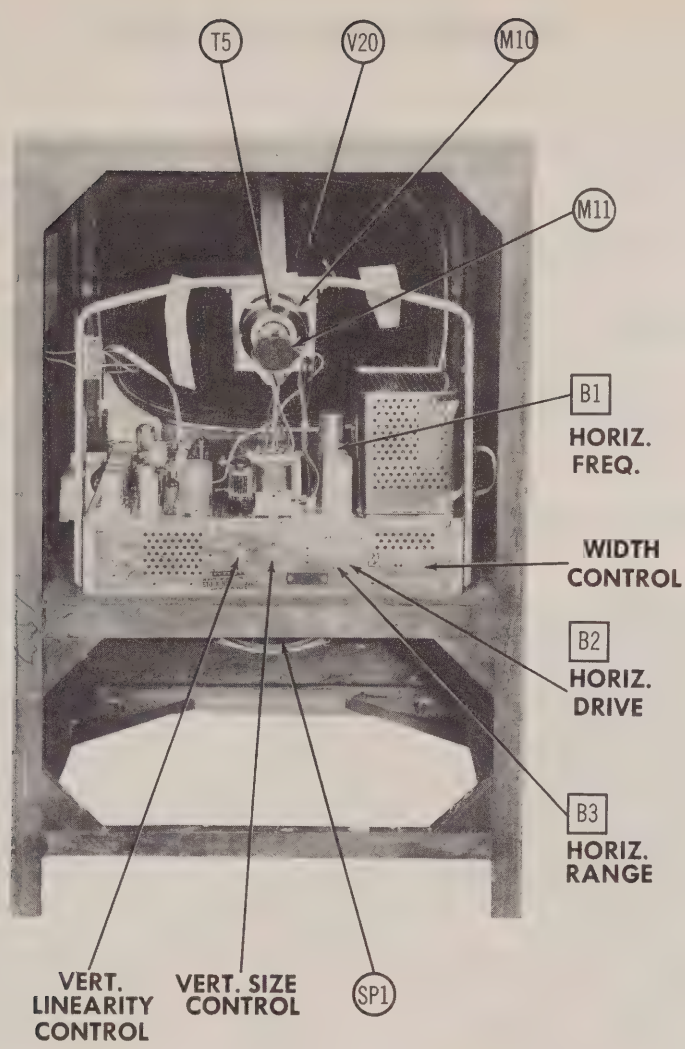




VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

The following adjustments are for receivers that do not include the letter "E" in the series designation on the rear of the chassis.
Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal frequency slug (B1) and the horizontal waveform slug (B2) fully counter clockwise.
2. Short terminal "C" to terminal "D" on L33.
3. Turn the horizontal range trimmer (B3) fully clockwise.
4. Set the horizontal hold control fully counter clockwise.
5. Adjust B1 until picture just locks in horizontally.
6. Remove short from terminals "C" and "D" on L33. If necessary, adjust B2 until picture locks in.
7. Connect the vertical amplifier of an oscilloscope to terminal "C" of L33. Connect low side to chassis. Adjust B2 for waveform similar to Fig. 11.
8. Set horizontal hold control counter clockwise and adjust B1 until picture locks in and remains in sync when switching off channel and back again. Adjust B1 slowly counter clockwise until picture is just ready to lose sync.
9. Check for proper horizontal hold action as follows:
   a. Turn horizontal hold control fully counter clockwise. Switch off channel and back again. Picture may remain in or be just out of sync.
   b. Turn horizontal hold control fully clockwise. Switch off channel and back again. Picture may lose sync.
   c. With horizontal hold control in its mid-range position picture should remain in sync when switching off channel and back again.

For receivers that include the letter "E" in the series designation on the rear chassis.

1. Same as for chassis that do not include "E" designation.
2. Same as for chassis that do not include "E" designation.
3. Set the horizontal driver trimmer (B') $\frac{1}{2}$ turn from its fully clockwise position.
4. Set the horizontal hold control to its fully clockwise position.
5. (thru 9) . Same as for chassis that do not include "E" designation.

Adjust the horizontal drive trimmer (B4) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.
Adjust the width control (R8A) for a picture that is slightly wider than necessary to fill the picture mask horizontally. It may be necessary to recheck B4 and alternately readjust B4 and R8A to obtain proper width with best linearity.

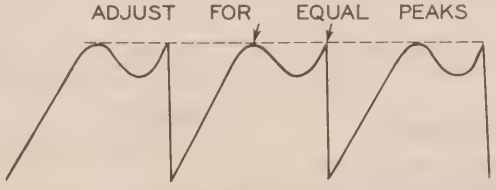


FIG. 11

SET 244 FOLDER 12

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16, V17 and V19. Check adjustment of the width control and B4. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check C105, C107, C108, C109, R100, R101, R107, R8, T3, T5A and other associated circuit components.	Check R94, R98, C102, C103 and other associated components.

DRIVE LINES

Check adjustment B4. Check by substitution V16 and V17. Check C102, C103, C107, C108, C109, T3, T5A, C112 and other associated circuit components.

COMPRESSED LEFT SIDE

Check adjustment of the width control and B4. Check by substitution V16 and V17. Check components associated with the horizontal output especially T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16 and V17. Check T3 and T5A for internal arcing.

XMAS TREE EFFECT

Substitute V15. Check adjustments B1, B2 and B3. Check C100, L33 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R6, R82 and other associated circuit components.	Check R76, R77, R81, C91, T2 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check T4, T5B, C3B and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check T2, C87, C91, R79, R81 and other associated circuit components.

FOLDS

Check by substitution V13 and V14. Check components associated with V13B and V14 for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13. Check C81, C82, C84, R62, R63, R65, R66, R67, R68, R69 and other associated circuit components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T2, R75, R74, vertical hold control, C86 and other associated circuit components.	Check vertical integrator and other associated circuit components. Check video IF and amplifier stages for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V15. Check adjustments B1, B2 and B3. Check C100, C101, C92, C93, C94, C95, L33 and other associated circuit components for failure or change of value.

HORIZONTAL BENDING

Check by substitution V15 and V16. Check the horizontal AFC filter network for component failure or change of value.

VIDEO

LOSS OF VIDEO

Substitute V7. Check video detector crystal and assembly. Check picture tube and associated circuit components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check A15 and video IF alignment.

POOR CONTRAST

Substitute V7. Check video detector assembly. Check contrast control, picture tube and other associated components.

NEGATIVE PICTURE

Check by substitution V7, V8, V2, V4 and V5. Check video detector crystal and assembly. Check AGC network components. Check picture tube and components associated with the video IF and tuner stages.

SMEAR

Substitute V7. Check video detector assembly. Check C64, R42, R41, R46, L29, L30, picture tube and other associated components for failure or change of value.

WIDE BLACK BAR ACROSS PICTURE

Check V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10 and V11. Check stages V10B and V11 using audio signal generator. Apply audio signal across R57.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check R58, R59, R60, T6, C78, C80 and other associated components.

BUZZ

Adjust tuner fine tuning for best picture and sound. Adjust A14 for minimum buzz. If still unsatisfactory, substitute V10 and realign audio IF and ratio detector stages. Check C71, and C6 for leakage.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

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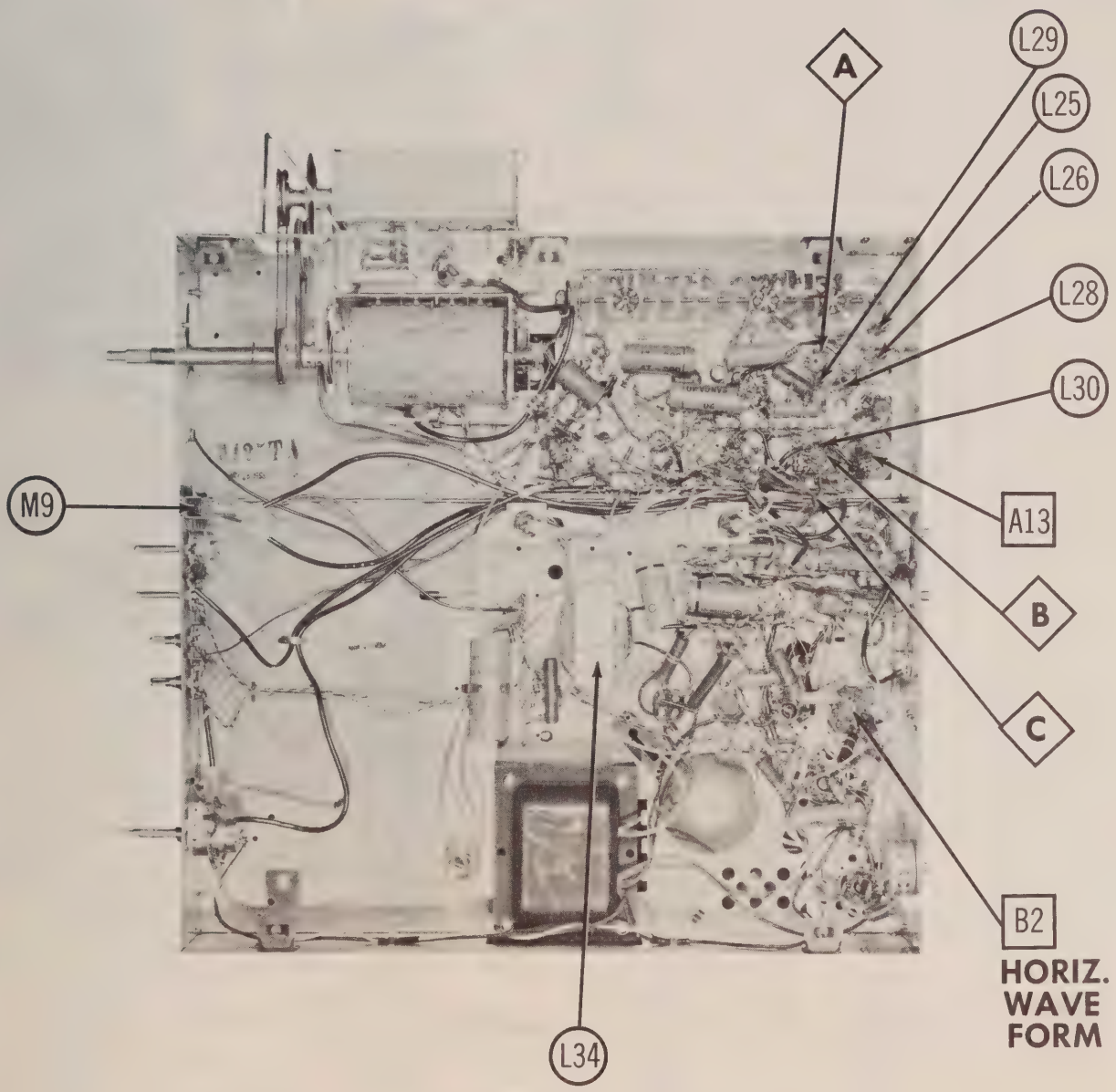

CHASSIS BOTTOM VIEW- INDUCTOR AND ALIGNMENT IDENTIFICATION

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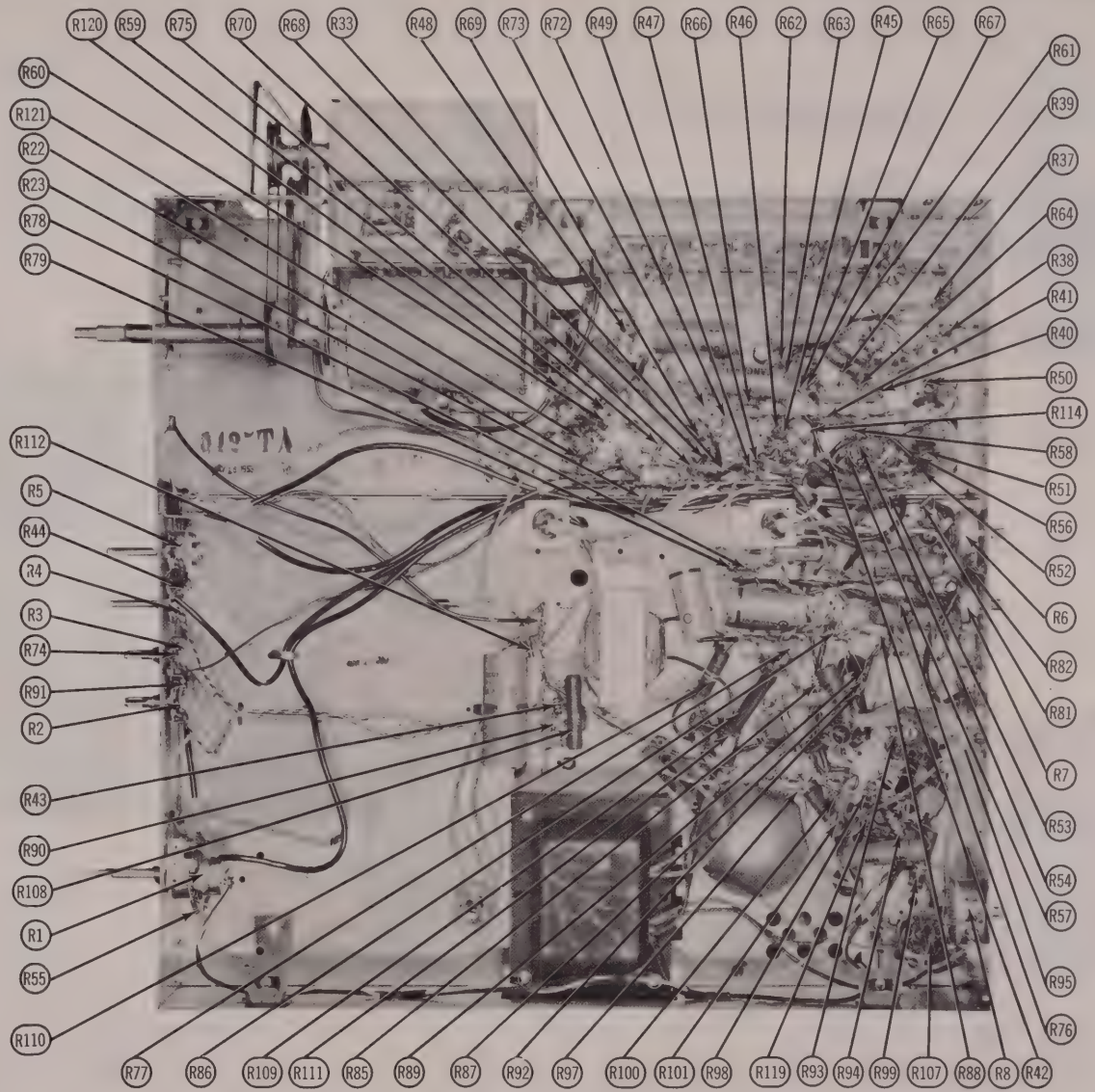
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6J6	6J6	7BF	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Det.- AF Amp. - AGC Clamper	6T8	6T8	9E	
V11	Audio Output	6AQ5	6AQ5	7BZ	
V12	Sync Separator	6BE6	6BE6	7CH	
V13	Sync Amplifier- Vert. Oscillator	12AU7	12AU9	9A	
V14	Vert. Output	6AH4GT	6AH4GT	8EL	
V15	Horiz. AFC- Horiz. Oscillator	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: TRUETONE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V20	21MP4	21MP4	21MP4		21MP4	12M	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	450	508072	AFH3-44		C035		FP377	TVL-3787	
B	▲40	450								
C	■40	450								
C2	40	300	160095	PRS450/40		BR4035		TC78	TVA-1611	
C3A	▲80	250	509002	AFH3-142		C109		FP375	TVL-3802	
B	■100	50								
C4	4	450	504719	PRS450/4		BR445		TC70	TVA-1702	
C5	4	450	504719	PRS450/4		BR445		TC70	TVA-1702	
C6	10	150	505174	PRS150/12		BR1015		TC42	TVA-1406	
C7	1			SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C8	1			SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C9	2.4									
C10	.8-6.5									
C11	.25									
C12	.25									
C13	.8-6.5									
C14	2.5									
C15	2.2			SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C16	3-10									
C17	6									
C18	68			SI68	D6-680	TP32	GP1K-680	UC-5468	5GA-Q68	
C19	68			SI68	D6-680	TP32	GP1K-680	UC-5468	5GA-Q68	
C20	.7									
C21	8									
C22	100									
C23	3-9		509064		829-10					
C24	800			EF-001	MFT-1000				503C-D1	
C25	3		513453	SI3NP0	TCZ-3	Z007	NP0K-030	ZT-5533	5TCCB-V33	
C26	800			EF-001	MFT-1000				503C-D1	
C27	.5-3		509063		829-3		3115-01-0R5	CT565A		
C28	1.5		513033	SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C29	68		513040	SI68	D6-680	G038	811-680	UC-5468	5GA-Q68	
C30	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31	800			EF-001	MFT-1000				503C-D1	
C32	47		520719	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C33	.5-3		509063		829-3		311-01-0R5	CT565A		
C34	10		513437	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1	
C35	5		513450							
C36	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C37	6.8		513451	SI6.8N P0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C38	1000		513041	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C39	800			EF-001	MFT-1000				503C-D1	
C40	800			EF-001	MFT-1000				503C-D1	
C41	1000		513009	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	110		513452			G043	GP2K-111			
C43	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C44	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C45	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C46	8.2		513455							
C47	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C48	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C49	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C50	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C51	1500		513038	SI5100	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C52	12		513448							
C53	5		513449							
C54	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	Note 2
C55	470		513037	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C56	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C57	680		513044	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	Note 3
C58	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	
C59	1500		513038	SI1500	D6-152	TP54	GP2L-152	UC-5215	5HK-D15	Note 4
C60	4		513454							
C61	5		513432	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C62	.22	200	512238	P288-22		CUB2P22		PT4022	2TM-P22	
C63	47		513438	SI47NP0	TCZ-47	TZ22	NP0K-470	ZT-5447	5TCC-Q47	
C64	.1	200	512216	P288-1	DF-104	CUB2P1		PT401	2TM-P1	

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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C65	.047	200	512235	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C66	220	1000	513032	HVD15-00022		VT22		1R5KV-221	10GA-T22	
C67	.47	200	512239	P288-47		CUB2P47		PT4047	2TM-P47	
C68	3.3		513001	S12.5NP0	TCZ-3.3	TZ05			5TCCB-V33	
C69	5000		513013	BPD-005	DD-502	K080	811-006		5HK-D5	
C70	5000		513013	BPD-005	DD-502	K080	811-006	DC-525	5HK-D5	
C71	1500		513010	BU1500	DD-152	TP54	GP2L-153	UC-5215	5HK-D15	
C72	5000		513013	BPD-005	DD-502	K080	811-006	DC-525	5HK-D5	
C74	.047	200	512235	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C75	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C76	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C77	270		513006	SL270	D6-271	TP41	GP2K-271	UC-5327	5GA-T27	
C78	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT41	4TM-S1	
C79	.01	400	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT41	4TM-S1	
C80	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C81	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C82	.047	200	512235	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C83	.47	200	512239	P288-47		CUB2P47		PT4047	2TM-P47	
C84	.01	400	512206	P488-01	D6-103	CUB4S1	GP2-333-103	PT41	4TM-S1	
C85A	.01							PT41		
B	.002		◆508062	‡BPD-01	‡DD-103	‡K082	‡ 811-01	PT622	‡5HK-S1	
C	.005			PA-110	PC-100	115TMI	1405-01	PT625	10IC1	
D	.005							PT625		
C86	4700	1000	513033							
C87	.047	400	512236	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C88	.022	400	512233	P488-022	DF-203	CUB4S22	817-02	PT4122	4TM-S22	Note 5
C89	.01	200	512205	P488-01	D6-103	CUB4S1	GP2-333-103	PT41	4TM-S1	Note 6
C90	.1	200	512216	P288-1	DF-104	CUB2P1		PT401	2TM-P1	Note 7
C91	.1	600	512218	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C92	100	500	512502	1469-0001		32M5T1		MC8235	M8-3A	
C93	10-180		W520991							Note 8
C94	47	1000	513030	HVD15-000047		VQ47		1R5KV-470	10GA-Q47	
C95	.0022	400	512232	P488-0022	D6-222	CUB4D22	GP2-333-222	PT4222	4TM-D22	
C96	.047	400	512236	P488-074	DF-503	CUB4S47		PT4147	4TM-S47	
C97	.047	200	512235	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C98	.47	200	512239	P288-47		CUB2P47		PT4047	2TM-P47	
C99	.022	400	512233	P488-022	DF-203	CUB4S22	817-02	PT4122	4TM-S22	
C100	200		513427							
C101	.01	400	512205							Note 9
C102	820	500	512547							
C103	1000		513009	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C104	270		513006	SI270	D6-271	TP41	GP2K-371	UC-5327	5GA-T27	Note 10
C105	.1	600	512218	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C106	.22	400	512238	P488-22		CUB4P22		PT4022	4TM-P22	
C107	.047	600	512237	P688-047		CUB6S47		PT6147	6TM-S47	
C108	.022	600	512234	P688-022		CUB6S22		PT6122	6TM-S22	
C109	.047	200	512235	P288-047		CUB2S47		PT4147	2TM-S47	
C110	500	20000	520990	HV20C	TV3-502	MMU20TS	413	HV20035A	20DK-T5	
C111	100		512502	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	Note 10
C112	56	1500	513027				GP2K-560		20GA-Q56	
C113	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C114	5000		513013	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 11
C115	1500		513010	BU1500	DD-152	TP54	GP2L-152	UC-5215	5HK-D15	Note 11
C116	1500		513010	BU1500	D6-152	TP54	GP2K-152	UC-5215	5HK-D15	Note 11
C117	680		513044	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	Note 12

Note 1. Value changed to 9MMF (part #512447) when letter "A" is not included in series designation.
Note 2. Used only when letter "A" is included in series designation.
Note 3. Value changed to 470MMF (part #513037) when letter "A" is not included in series designation.
Note 4. Value changed to 8MMF (part #513443) when letter "A" is not included in series designation.
Note 5. Some models may use .03MFD or 5000MF in this application.
Note 6. Not used in all Models.
Note 7. Used only when letter "G" is included in series designation.
Note 8. Some models may use a 47MMF in this application (part #513030).
Note 9. Mfg'r part number ◆comes 512311 when letter "F" is included in series designation.
Note 10. Used only when letter "E" is included in series designation.
Note 11. Used only when letter "A" is not included in series designation.
Note 12. Used only when letter "K" is included in series designation.
◆ Items C85A, C85B, C85C, C85C, R73A, R73B, R73C are combined in one unit.
† To replace mfgr's original item, install 1000GMMF unit in series with C-R unit input lead.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	300Ω	½	521288	◆QJ-517			WF32	Contrast -Panel
B	1Meg	½					UR16-T25 †	Volume-tapped@220KΩ-Rear
C	Switch						US-26	Attach to R1B
R2A	50KΩ	½	521069	Q1l-123	A47-50K-8	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	K58-3	AK-4	Not Req.	Attach to R2A
R3A	1Meg	½	521058	Q1l-137	A47-1Meg-8	AB-59	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	K58-3	AK-4	Not Req.	Attach to R3A
R4A	100KΩ	½	509893	Q1l-133	A47-100K-8	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	RS-3/16	AK-4	Not Req.	Attach to R4A
R5A	500KΩ	½	520651	Q1l-133	A47-500K-8	AB-59	U-50	Tone - Note 1
B	Shaft		Not Req.	Not Req.	K58-3	AK-4	Not Req.	Attach to R5A
R6A	5000Ω	½	520845	Q1T-1/4	A47-5000-8	AB-12	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	2.5Meg	½	520944	Q1l-239	A47-2.5Meg-8	AB-53	SU-565	Vert. Sine
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	400Ω	4	520996	4WK-400	A10-400	SVP-991	M400P	Width
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R8A

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B1l-103 & P1-112 (Panel B13-137X & R1-202 (Rear) & SWITCH 76-1.
† UNIVERSAL REPLACEMENT (Mallory exact duplicate part #UE4W8).
Note 1. Some models may use an alternate control part #520746.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R9	470KΩ	½		BTS-470K	
R10	470KΩ	½		BTS-470K	
R11	12KΩ	½		BTS-12K	
R12	15KΩ	½		BTS-15K	
R13	47KΩ	½		BTS-47K	
R14	330KΩ	½		BTS-330K	
R15	220KΩ	½		BTS-220K	
R16	470Ω	½		BTS-470	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R17	15KΩ	½		BTS-15K	
R18	220KΩ	½		BTS-220K	
R19	15KΩ	½		BTS-15K	
R20	10KΩ	½		BTS-10K	
R21	4700Ω	½		BTS-4700	
R22	100Ω	½	510118	BTS-100	
R23	4700Ω	2	510349	BTS-4700	
R24	6800Ω	½	510151	BTS-6800	
R25	47Ω	½	510112	BTS-47	
R26	6800Ω	½	510151	BTS-6800	Note 17
R27	1200Ω	½	510138	BTS-1200	
R28	24KΩ 5%	½	510783	BTS-24KΩ 5%	
R29	100KΩ	½	510172	BTS-100K	Note 20
R30	120KΩ	½	510174	BTS-120K	Note 20
R31	6800Ω	½	510151	BTS-6800	Note 18
R32	47Ω	½	510112	BTS-47	
R33	470Ω	½		BTS-470	Note 20
R34	8200Ω	½	510153	BTS-8200	
R35	82Ω	½	510117	BTS-82	Note 19
R36	470Ω	½	510130	BTS-470	
R37	6800Ω	½	510151	BTS-6800	Note 15
R38	5600Ω	½	510150	BTS-5600	
R39	8200Ω	½	510153	BTS-8200	
R40	15KΩ 5%	½	510744	BTS-15K 5%	Note 12
R41	3900Ω	1	510347		Note 13
R42	100KΩ	½		BTS-100K	
R43	470KΩ	½		BTS-470K	Note 9
R44	22KΩ	½		BTS-22K	Note 15
R45	33KΩ	½	510153	BTS-33K	
R46	1500Ω	½	510139	BTS-1500	Note 14
R47	100KΩ	½	510172	BTS-100K	
R48	100KΩ	½	510172	BTS-100K	
R49	3.3Meg	½	510701	BTS-3.3Meg	
R50	82Ω	½	510117	BTS-82	
R51	4700Ω	1	510349	BTA-4700	
R52	220Ω	½	510124	BTS-220	
R53	18KΩ	½	510159	BTS-18K	
R54	22KΩ	½	510160	BTS-22K	
R55	68KΩ	½	510169	BTS-68K	
R56	220Ω	½	510124	BTS-220	
R57	10Meg	½	510197	BTS-10Meg	
R58	470KΩ	½	510184	BTS-470K	
R59	560KΩ 5%	½	510778	BTS-560K 5%	
R60	820KΩ 5%	½	510747	BTS-820K 5%	
R61	47KΩ	½	510166	BTS-47K	
R62	2.2Meg	½	510193	BTS-2.2Meg	
R63	820KΩ	½		BTS-820K	Note 6
R64	18KΩ	½	510159	BTS-18K	
R65	82KΩ	½	510171	BTS-82K	
R66	22KΩ	½	510160	BTS-22K	
R67	220KΩ	½	510178	BTS-220K	
R68	10Meg	½	510197	BTS-10Meg	
R69	22KΩ	½	510160	BTS-22K	
R70	10KΩ	½	510148	BTA-10K	Note 7

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	NOTES
R71	4700Ω	1	510254	BTA-4700	
R72	18KΩ	½	510159	BTS-18K	
R73A	22KΩ	½		BTS-22K	
B	8200Ω	½	◆508062	BTS-8200	
C	8200Ω	½		BTS-8200	
R74	220KΩ	½	510178	BTS-220K	
R75	1.2Meg 5%	½	510777	BTS-1.2Meg 5%	
R76	470KΩ	½	510184	BTS-470K	
R77	330KΩ	½	510181	BTS-330K	
R78	100KΩ	½	510172	BTS-100K	Note 11
R79	8200Ω	½	510153	BTS-8200	
R80	47KΩ	½	510167	BTS-47K	Note 15
R81	2.2Meg	½	510193	BTS-2.2Meg	
R82	390Ω	½	510129	BTS-390	
R83	560Ω	½	510132	BTS-560	
R84	560Ω	½	510132	BTS-560	
R85	330KΩ	½	510181	BTS-330K	
R86	820KΩ	½	510189	BTS-820K	
R87	100KΩ	½	510172	BTS-100K	
R88	330KΩ	1	510282	BTA-330K	
R89	4700Ω	½	510148	BTS-4700	
R90	68KΩ	½	510169	BTS-68K	
R91	120KΩ	½	510174	BTS-120K	
R92	150KΩ	½	510175	BTS-150K	
R93	10KΩ	½	510154	BTS-10K	
R94	68KΩ	½	510289	BTA-68K	
R95	150KΩ	½	510175	BTS-150K	Note 3
R96	150KΩ	½	510175	BTS-150K	Note 5
R97	330KΩ	½	510181	BTS-330K	Note 4
R98	470KΩ	½	510184	BTS-470K	
R99	100Ω	2	510318		
R100	47KΩ	½	510166	BTS-47K	
R101	12KΩ	2	510356	BTB-12K	
R102	150KΩ	½	510175	BTS-150K	Note 8
R103	56KΩ	½	510168	BTS-56K	Note 8
R104	1 Meg	½	510190	BTS-1 Meg	Note 8
R105	3.3Ω	½	510725		
R106	1 Meg	½	510190	BTA-1 Meg	
R107	680Ω	½	510154	BTS-680	
R108	600Ω	10	510741	1 3/4A-600	
R109	400Ω	10	510779	1 3/4A-400	
R110	15KΩ	2	510357	BTB-15K	
R111	1500Ω	½	510139	BTS-1500	
R112	10Ω	½	510101	BTS-10	
R113	150KΩ	½	510175	BTS-150K	
R114	100KΩ	½	510172	BTS-100K	
R115	7500Ω	5	510727		Note 2
R116	470KΩ	½	510184	BTS-470K	Note 10
R117	2200Ω	½		BTS-220	Note 16
R118	680Ω	½		BTS-680	Note 20
R119	10KΩ	½		BTS-10K	Note 21
R120	4700Ω	2		BTB-4700	
R121	2700Ω	2		BTB-2700	

◆ Items R73A, R73B, R73C, C85A, C85B, C85C, C85D are combined in one unit.
Note 1. R75 becomes 1.5Meg when the letter "B" is not included in series designation.
Note 2. R115 is omitted when the letters "A" and "C" are used in series designation.
Note 3. R95 becomes 220KΩ when the letter "E" is included in series designation.
Note 4. R97 becomes 1Meg when the letter "E" is included in series designation.
Note 5. Add R96 when the letter "E" is included in series designation .
Note 6. R63 becomes 1.5Meg when the letter "E" is included in series designation.
Note 7. R71 becomes 4700Ω and add R70 when the letter "E" is included in series designation.
Note 8. Add R102, R103, R104 when the letter "E" is included in series designation.
Note 9. R43 becomes 330KΩ when the letter "E" is included in series designation.
Note 10. Add R116 when the letter "G" is included in series designation.
Note 11. R78 becomes 47KΩ when the letter "G" is included in series designation.
Note 12. R40 becomes 12KΩ when the letter "H" is included in series designation.
Note 13. R41 becomes 2200Ω when the letter "H" is included in series designation.
Note 14. R46 becomes 1800Ω when the letter "H" is included in series designation.
Note 15. Not used in all models.
Note 16. R117 is omitted when the letter "A" is included in series designation.
Note 17. R26 becomes 8200Ω when the letter "A" is not included in series designation.
Note 18. R31 becomes 10KΩ when the letter "A" is not included in series designation.
Note 19. R35 becomes 56Ω when the letter "A" is not included in series designation.
Note 20. Used only when the letter "A" is not included in series designation.
Note 21. Used only when the letter "E" is not included in series designation.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordorson PART No.
T1	117VAC @1.75A	660VCT .190ADC	5VAC @ 3A	530951						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @2.8A	12.6VCT @3A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordorson PART No.
T2	Vert. Osc. Trans.	520980	A-S123	A-3003	A-97X	209T1①	B6702	24A87①
T3	Horiz. Output Trans.	521066		HVO-9 ⑥	D-19 ⑥	232T1 ⑥	FB411 ⑥	
T4	Vert. Output Trans.	520975 ②	A-S123①	A-3037①	A-62X①	232T1①	21804 ①	26852 ①
T5A	Yoke-Horiz.(39MH)	520942 ④	DY-9A④ ⑦	MDF-72① ④	Y-17-K① ④	21UD3① ④	DF802① ④	Y-7 ①④
B	Yoke-Vert. (37MH)	521267③						

① Drill one new mounting hole.
② Drill new mounting holes.
③ Includes connectors for defelction yoke leads.
④ Includes leads, connectors and resistors R83 and R84.
⑤ Yoke cover and positioning device.
⑥ Use original yoke cover and positioning device.
⑦ Remove C112 from yoke terminal strip on top of vertical output trans.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordorson Replacement Connections
	8		Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	
	7		9	9	10	9	
	6		7	7 & 8	8	8	
	5		5	5	6	5	
	3		T	T	5	4	
	2		3	3	2 & 3	T or 3	
	1		1	1	1	1	
Special Notes →					⑤		

⑤ If insufficient width, connect a .005MFD 600V capacitor across terminal "T" and #3.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA TRUETONE PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordorson PART No	NOTES
T6	4.3KΩ	3.3Ω	509376	A-3877	A-2930	S-5X	Z1001	22S46	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6 x 9'	PM	3.3Ω	508174	ST-810 Mod. P69-V	69A2	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	UHF Ant. Coil	0Ω						
B	UHF Mixer Coil	0Ω						
C	UHF Osc. Coil	0Ω						
L2	UHF Ant. Coil End							
	Inductor	0Ω						
L3	UHF Mixer Coil End							
	Inductor	0Ω						
L4	UHF Osc. Coil End							
	Inductor	0Ω						
L5	Fil. Choke	.2Ω						
L6	Fil. Choke	.2Ω						
L7	Cathode Choke	.1Ω						
L8	UHF IF Coupling	.1Ω						
L9	UHF IF Output Coil	0Ω	0Ω					
L10	RF Choke	.1Ω						
L11A	VHF Ant.Coil	00CT	0Ω	521822				Channel 2
B	VHF Ant.Coil	00CT	0Ω	521823				Channel 3
C	VHF Ant.Coil	00CT	0Ω	521824				Channel 4
D	VHF Ant.Coil	00CT	0Ω	521825				Channel 5
E	VHF Ant.Coil	00CT	0Ω	521826				Channel 6
F	VHF Ant.Coil	00CT	0Ω	521827				Channel 7
G	VHF Ant.Coil	00CT	0Ω	521828				Channel 8
H	VHF Ant. Coil	00CT	0Ω	521829				Channel 9
I	VHF Ant. Coil	00CT	0Ω	521830				Channel 10
J	VHF Ant. Coil	00CT	0Ω	521831				Channel 11
K	VHF Ant. Coil	00CT	0Ω	521832				Channel 12
L	VHF Ant. Coil	00CT	0Ω	521833				Channel 13
M	UHF Strip	0Ω		521821				Used in UHF position only
L12	Fil. Choke	0Ω		520516				
L13	Neutr. Coil	0Ω		520701				
L14A	RF, Mixer Grid & Osc. Coils	0Ω		521842				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		521843				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		521844				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		521845				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		521846				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		521847				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		521848				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		521849				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		521850				Channel 10

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: TRUETONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
J	RF, Mixer Grid & Osc. Coils	0Ω		521851				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		521852				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		521853				Channel 13
M	UHF Strip	0Ω		521841				Used in UHF position only; includes resistors & capacitor
L15	Fil. Choke	0Ω		520520				
L16	RF Choke	0Ω		521835				
L17	Feedback Coil	1.4Ω		521834				
L18	Conv. Plate	.1Ω		521836				
L19	1st Video IF Grid	1.3Ω						Includes trap (1.5Ω); Note 4
L20	1st Video IF Plate	1.8Ω						Note 4
L21A B	41.25MC Trap 47.25MC Trap	1.5Ω 1.1Ω						Note 4
L22	2nd Video IF Grid	.8Ω						Note 4
L23	3rd Video IF	1.9Ω	1.3Ω					Note 4
L24	4th Video IF	1.6Ω	1.5Ω					Note 4
L25	Series Peak. Coil	8.5Ω		520620	19-3180	TV-184	6180	180 Microhenries
L26	Shunt Peaking Coil	11Ω		520985	19-3660		4650	650 Microhenries
L27	Series Peak. Coil			522020				Note 1
L28	4.5MC Trap	1.7Ω		509603 *	20-1004	TV-151	1470	
L29	Series Peak. Coil	7Ω		520984	19-3160	TV-184	4644	160 Microhenries; Note 2
L30	Shunt Peaking Coil	6.5Ω		520986	19-3660		4650	660 Microhenries; Note 3
L31	Sound IF	1Ω		509378	16-3445 †	TV-113 †	1470-A	
L32	Ratio Det.	3.9Ω	8ΩCT	509706	17-3493	TV-115 ▲	1498	Tertiary winding =.5Ω
L33	Horiz. Osc.	80Ω		520943	20-1402 ■	TV-162 ■	6183 ■	Includes slug; slug Part # 521064; Pri. tapped @ 60Ω, horiz. waveform winding=44Ω

Note 1. Used in chassis when letter "D" is included in series designation.
Note 2. Chassis with letter "H" series designation use series peaking coil (Part # 520689)-180 Microhenries Meissner Part # 19-3180; Merit Part # TV-184 & Miller Part # 6180.
Note 3. Chassis with letter "H" series designation use series peaking coils (Part # 509342)-394 Microhenries Meissner Part # 19-1923; Merit Part #TV-184 Miller part #4648.
Note 4. Used when letter "A" is included in series designation.
* Truetone Part # includes slug & C63; slug Part # 507357.
† Use one winding only.
▲ Use adaptor plate.
■ Reverse coil mounting in coil.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: TRUETONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L34	.190ADC	73Ω	2.9 Hy.	508341	C-2326	C-2991 ①		C5030	26C44

① Drill one new mounting hole.

FUSES

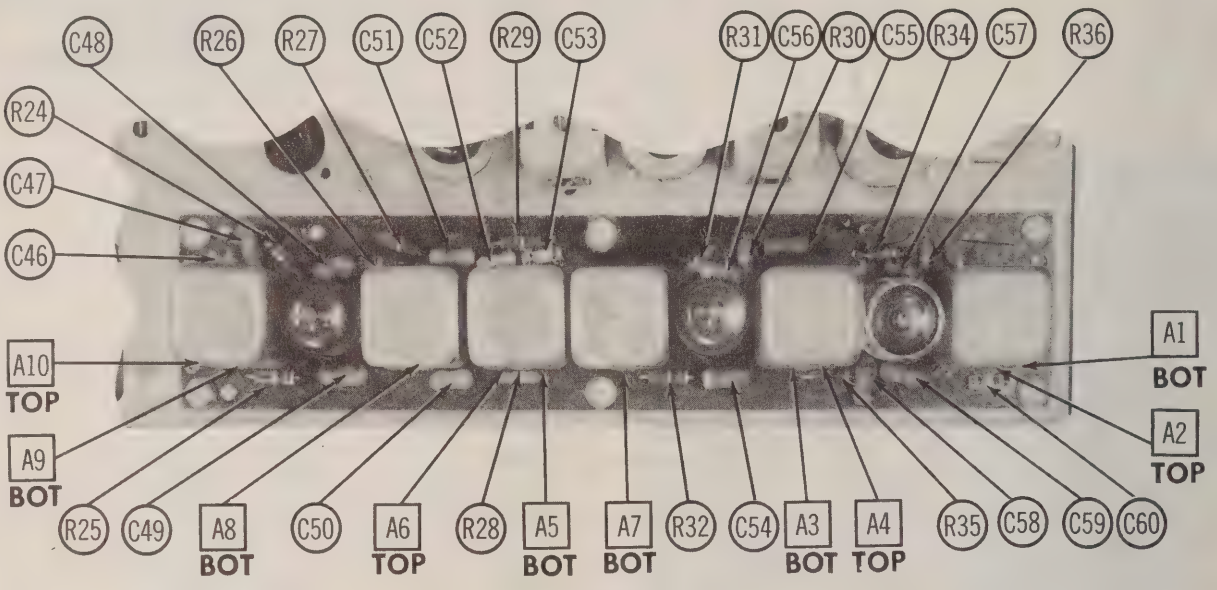
ITEM No.	TYPE	RATING	REPLACEMENT DATA: TRUETONE PART No. FUSE	TRUETONE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG S/B	4A 125V	521803	520989	313004. (3AG S/B -4A)	357002	MDX4	4408
M2	3AG	1/4A 250V	508713	520989	312.250 (3AG - 1/4A)	357002	AGC 1/4	4408

CRYSTAL DIODES

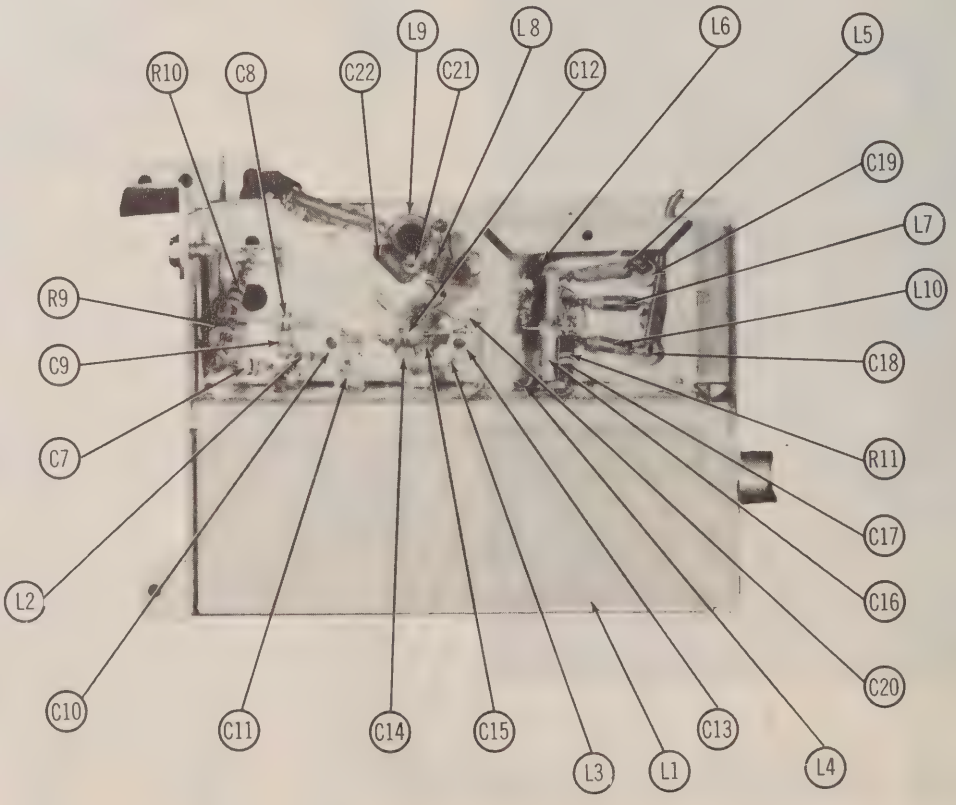
ITEM No.	ORIG. TYPE	REPLACEMENT DATA: TRUETONE PART No.	SYLVANIA PART No.	FEDERAL PART No.	NOTES
M3	1N82		1N82 or 1N82A		UHF Mixer
M4	1N64	509386	1N132	1N64A	Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M5	Dial Light	118921	#47 Bayonet
M6	Tuner	521187	VHF
M7	Tuner	521170	UHF
M8	Switch	521188	UHF/VHF changeover
M9	Switch	520563	TV-phono
M10	Centering Magnet	521267	Part of yoke cover
M11	Ion Trap	521183	
B3,B4	Trimmer Cap.	W520991	Horiz. locking range of drive (10-160MMF)
	Cabinet	521971	Model 9038A
	Cabinet	521969	Model 9081A
	Knob	521278	Channel Selector
	Knob	521281	Contrast
	Knob	521280	VHF fine tuning / UHF station selector
	Knob	521279	Volume
	Dial	521282	UHF
	Safety Glass	520937	
	Terminal Strip	521095	Deflection yoke connections on vert. output trans.



VIDEO IF ASSEMBLY



UHF TUNER-BOTTOM VIEW

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check fuse M1, AC interlock assembly, switch on volume control and T1. If filaments light, substitute V19. Check B+ filter and decoupling network components.

SMALL AND/OR DIM PICTURE

Substitute V19. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M2. Check by substitution V15, V16, V17 and V18. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check C110, C105, R105, R106, R100, R101, T3, T5A and other associated circuit components.	Check R94, R98, L33, C102, C103, and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V16, V17, V18 and V19. Check R105, R106, R100, R101, C110, C105, T3, T5A and other associated circuit components.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO PICTURE NO SOUND

Check by substitution V2, V3, V4, V5, V6 and V7. Check video detector crystal and assembly. Check video IF and tuner components. In case of UHF, check V1 and associated components.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

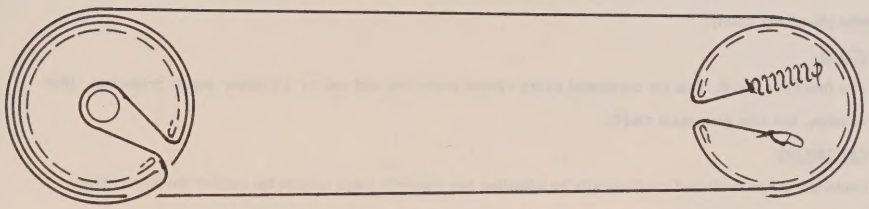
KEYSTONE EFFECT

Check T5, C112, R83 and R84.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



TUNING GANG FULLY COUNTER-CLOCKWISE.

UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

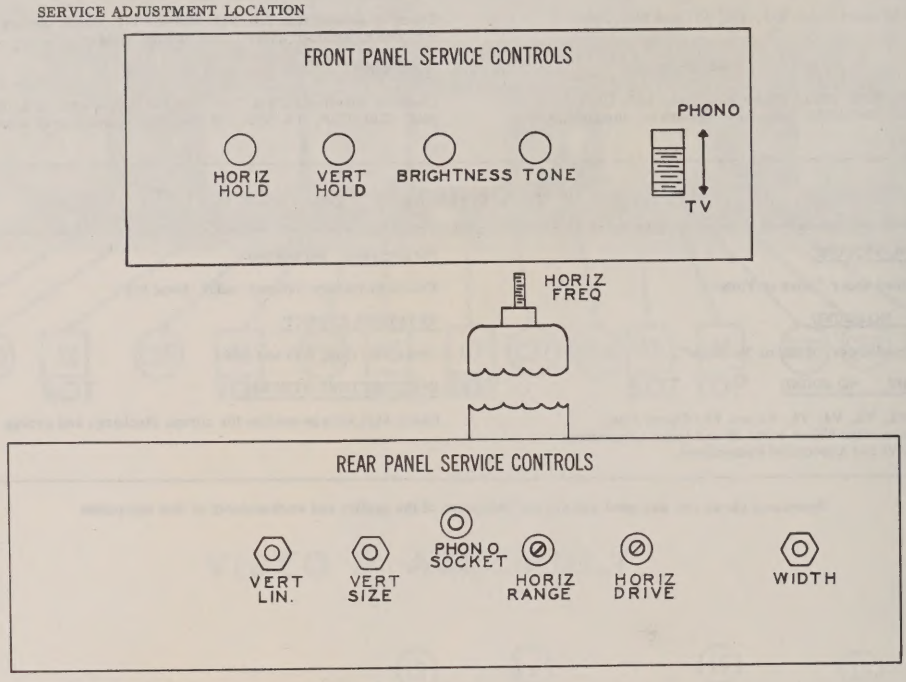
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding wood strip at top front of cabinet. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (L33) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L32) located on top of chassis. (See tube placement chart).

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 5 push on type control knobs from front panel.
2. Disconnect built-in antenna.
3. Remove 7 wood and 1 metal screws. Remove rear cover.
4. Disconnect speaker leads.
5. Remove 5 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

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